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MECHANICAL PROCESSING
OF COTTON

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Research at the Southern
Utilization Research and
Development Division,
New Orleans, Louisiana

Compiled by
Marie A. Jones
March 1961
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Agricultural Research Service
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NEW DEVELOPMENTS IN AN ANCIENT ART

The spinning of cotton into yarn, and weaving of the yarn into cloth, is one of the oldest of man's arts. It might seem that after thousands of years little room would be left for improvement, but the many new developments which have come about in the past century or two demonstrate that this is far from true.

Southern Utilization Research and Development Division has conducted an intensive program of research to improve processing methods and develop textile machinery for processing cotton, and many important contributions have come in this field.

One of the first of the major contributions was the SRRL Opener, for opening and fluffing cotton at the mill before cleaning. This machine won wide acceptance both here and abroad because of its excellent performance. A few years later a cleaning unit was incorporated into the Opener to make the SRRL Opener-Cleaner. The Opener is credited with annual savings to the industry of \$1.5 million, and the Opener-Cleaner with savings averaging \$2 per bale. Growing use of mechanical harvesting has made these machines especially valuable because of their efficiency in the handling of trashy cottons.

An interesting recent development is the SRRL Granular Card, the first major change in such machines for more than 75 years. It is a radical departure from the conventional card in that moving flats are eliminated, reducing wear and power requirements. The Granular Card was released to the textile industry March 30, 1959. Fifteen firms in this country and several abroad have been licensed to manufacture this card.

Success of these and other machines and attachments have inspired the idea of an integrated system for cleaning and handling cotton in the textile mill. In such a system, all of the machines would be designed to operate in coordination for greater efficiency and economy.

The effects of fiber properties on product quality and processing efficiency have been investigated extensively. The results of investigations of the effect of fiber fineness on the physical properties of yarns and fabrics have had an important impact on the utilization of American cottons.

It has been demonstrated that fine or immature fibers and coarse (mature) fibers can be blended to produce satisfactory bleached fabric. This promises to furnish an outlet for immature cottons which otherwise would be hard to market.

Investigations of the effect of the short fiber content on cotton product quality and processing efficiency have shown conclusively that increasing percentages adversely affect the strength, uniformity, and appearance of both yarns and fabrics. Increases in short fibers markedly increase end breakage during spinning thereby restricting the speeds at which the

cotton can be spun efficiently. The investigation has given indications of procedures which will allow more efficient utilization of cottons of all levels of short fiber content.

A great deal of data have been accumulated on the effect of different processing organizations (drafts, speeds, roll settings, weighting, etc.) on the uniformity and strength of cotton during the process of converting it into yarn. Formulas for draft allocations in the spinning of short, medium, and long staple cottons have been prepared and made available to industry. Such formulas enable manufacturers to adjust draft allocations for the desired balance of quality and production volume, taking into consideration the fiber length and the size of yarn without time-consuming and expensive trial-and-error methods.

These are just a few of the highlights of accomplishments in our research on cotton machinery and mechanical processing reported in the various papers listed in this booklet.

We consider this an extremely important area of research, whether carried on here or elsewhere. Improvements in product quality and the lowering of cost are considered as vital to increased usage of cotton, and textile processing is one of the points at which these can be brought about.

PREFACE

X An abstract bibliography of all publications reporting research by the Southern Division on the utilization of cotton is now being prepared. For the convenience of those who may be interested in a specific area of work, however, we have also prepared listings of publications on research in some special fields.

We have assembled in this booklet abstracts of 170 published papers reporting results of research on the mechanical processing of cotton. Also included are 30 patents granted to members of the Southern Division staff covering machinery and other developments in this field. These patents have been assigned by the grantees to the Secretary of Agriculture for licensing to citizens of the United States on a royalty-free basis.

In order to make this listing as complete and as up-to-date as possible, we have also included 14 papers which have been accepted for publication by technical journals, and 18 more which are now being prepared.

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The number which appears to the left of each title is the number this publication has been given in our permanent reprint system and is included for your convenience in requesting reprints.

Single copies of available reprints may be obtained without cost from: Southern Utilization Research and Development Division, P. O. Box 19687, New Orleans 19, Louisiana.

Copies of patents are not distributed by the Division, but may be purchased from: U. S. Patent Office, Washington 25, D. C. (25 cents per copy).

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PUBLICATIONS PLANNED

THE EFFECT OF THE SHORT FIBERS IN A COTTON ON ITS PROCESSING EFFICIENCY AND PRODUCT QUALITY. PART IV. GREY, BLEACHED, MERCERIZED AND DYED, AND RESIN TREATED FABRICS.

Tallant, John D.; Fiori, Louis A.; and Sands, Jack E.

Print cloth fabrics (80 x 80) were produced from yarns spun from cotton containing different short fiber contents. For all fabric properties measured, with the exception of crease angle, increasing short fiber content resulted in significant changes adverse to quality, i.e., decreased strength, elongation, flex abrasion, and tearing strength. Subjective properties such as appearance and hand were also degraded as the short fiber content increased. The above conclusions apply equally to fabrics in the grey, bleached, mercerized and dyed, and resin-treated states. No conclusions could be drawn on the effect of short fibers on weaving performance due to the limited quantity of experimental material available.

THE SRRL YARN SPINNING MACHINE

Kyame, G. J.; and Copeland, H. R.

This paper describes a new yarn spinning method which permits the fabrication of knotless yarn strands of any desired length. Roving fed to the machine is drafted and twisted, and can be wound directly into packages of the shape and size desired. A medium number yarn has been spun at rates equivalent to conventional ring spinning production on a unit built to explore the feasibility of the method. The machine is still in a highly experimental stage and additional research will be necessary to determine its potential for industrial application.

A STUDY OF THE MEASUREMENT OF COTTON FIBER PARALLELIZATION

Simpson, Jack

The Lindsley mechanical method for measuring fiber parallelization was compared with a method similar to Morton's, using tracer fibers. It was found that sliver direction had a highly significant effect on the parallelization measurement with the Lindsley instrument. The tracer fibers showed that this was due to the predominance of hooked ends in one direction. This result indicated that the Lindsley instrument could be used to obtain a measurement of the predominance of hooked ends in a given direction. It was indicated that a high draft tended to straighten out more of the trailing than leading hooks. The tracer fibers showed that drafting tended to straighten and align the longer fibers better than the shorter ones of a particular cotton.

THE EFFECT OF COTTON FIBER MATURITY ON THE PHYSICAL PROPERTIES OF A TYPE 128 SHEETING. PART I. EFFECT ON WARP AND FILLING CONTRACTION OF GRAY FABRICS

Sands, Jack E.; Little, Herschel W. and Fiori, Louis A.

*Mathews, W. T., Jr.; *Mayne, S. C., Jr.; and *Berkley, E. E.

Since cotton fiber maturity and fineness (estimated from Micronaire readings) are highly correlated in American Upland cottons, the cottons used in this investigation were selected on the basis of their Micronaire readings which were as follows: 2.5, 3.0, 4.0, 5.0, and 6.0. Only the 3.0, 4.0 and 5.0 cottons were used to spin 21/1 (28 tex), 4.2 T.M. warp yarns, while all were used to spin 23/1 (26 tex) filling yarns with twist multipliers of 3.6, 4.2, and 4.8 for weaving a Type 128 sheeting. The series of filling yarns was woven randomly into the warps under both a "standard" and an "adjusted" tension setting on the preventer spring collar. Fabric width increased as the Micronaire reading of cottons used in filling yarns increased and as filling twist increased. However, the differences in fabric width - from the desired width of 36 inches - were essentially within commercial tolerances. Warp yarn crimp was only slightly affected by changes in Micronaire reading of cottons and twist used to spin filling yarns. Micronaire reading of cottons used to spin warp yarns affected warp yarn crimp only when the fabrics were woven with the "adjusted" tension setting.

THE EFFECT OF COTTON FIBER MATURITY ON THE PHYSICAL PROPERTIES OF TYPE 128 SHEETING. PART II. EFFECT OF WARP AND FILLING CONTRACTION OF BLEACHING AND DYEING

Sands, Jack E.; Little, Herschel W.; Fiori, Louis A.; and Castillon, Audrey V.; *Mathews, W. T., Jr.; *Mayne, S. C., Jr.; and *Berkley, E. E.

After bleaching and dyeing, significant progressive decreases in fabric width were noted in those fabrics woven with progressively coarser cottons in the filling yarns and with increases in filling twist. Filling twist was the greatest contributor to warp yarn crimp and was directly related to it. This is in contrast to the finding that increases in width and in warp yarn crimp of gray fabrics containing warp and filling yarns spun from the range of cotton fiber fineness (Micronaire reading) with a series of filling twists were noted with the progressive use of coarser cottons in the filling yarns.

*Anderson, Clayton & Company, Houston, Texas

THE EFFECT OF COTTON FIBER MATURITY ON THE PHYSICAL PROPERTIES OF A TYPE 128 SHEETING. PART III. EFFECT ON SELECTED PHYSICAL PROPERTIES OF GRAY FABRICS

Sands, Jack E.; Little, Herschel W.; Fiori, Louis A.; and Groves, Noble H.; *Mathews, W. T., Jr.; *Mayne, S. C., Jr.; and *Berkley, E. E.

Differences in cotton fiber fineness in warp yarns has an influence on warp and filling grab breaking strength of gray fabrics, with fabrics woven with yarns spun from a 3.0 Micronaire reading cotton having the lowest grab breaking strength. No such effect on warp and filling strip breaking strength of gray fabrics was noted. On the other hand, differences in cotton fiber fineness in filling yarns significantly affected filling strength of gray fabrics by both grab and strip methods with filling strength increasing as this fiber property was changed from 2.5 to 4.0, then decreasing with use of coarser cottons. These changes in cotton fiber fineness only slightly affected warp strip breaking strength and showed no effect on warp grab breaking strength. Of allied interest, increases in twist in filling yarns produced increases in strip and grab breaking strength of gray fabrics in the filling direction and caused decreases in warp strip breaking strength of gray fabrics but had no effect on warp grab breaking strength. With the use of progressively coarser cottons in filling yarns the resistance to flex abrasion of gray fabrics increased. In all cases, however, the fabric woven with warp yarns spun from the 4.0 (Micronaire reading) cotton had the highest resistance to flex abrasion.

THE EFFECT OF SELECTED COTTON FIBER PROPERTIES AND SPINNING VARIABLES ON SPINNING PERFORMANCE

**Waters, William T.; **Phillips, Joe; and Fiori, Louis A.

The effect of selected fiber properties, obtained by blending techniques, and spinning processing variables on the end breakage in spinning was investigated. For the ranges studied, spinning tension, spinning twist was investigated. For the ranges studied, spinning tension, spinning twist, and short fibers had the greatest effect on end breakage in the order named, while fiber fineness lower than about a 4.0 Micronaire reading had the least effect. Fineness above a 4.0 Micronaire reading and fiber strength, on the other hand, had an intermediate effect on end breakage. Exploratory investigations using high speed photography of the mechanism of end breakage showed that most ends break in the region between the pigtail guide and front roll of the spinning frame. For both warp and filling twist yarns, end breakage was caused mostly by fiber slippage rather than fiber breakage.

*Anderson, Clayton & Company, Houston, Texas

**School of Textile Technology, Auburn University, Auburn, Alabama

A LOOK AT THE PROCESSING PERFORMANCE OF SELECTED LIGHT SPOTTED COTTONS

Fiori, Louis A.; *Marsh, P. B. and Sloan, W.

Four types of weathered cotton samples were used for this study; namely, Aspergillus Flavus, Cavitomic, Frost, and Clay. Each type of spotted cotton was matched with a white control cotton of comparable fiber properties free from any weather damage. These light spotted cottons were blended individually in proportions of 25%, 50%, and 75% with its white undamaged control cotton. The results of this limited investigation indicate that light spotted cottons of the types and percentages used can be processed successfully and do not impair seriously the properties of either gray yarn or fabric. Blending spotted cotton with white cotton even in percentages as high as 50% appears to camouflage any undesirable effects, if the blending procedures used are efficiently controlled. The blended and control cottons were spun into a filling yarn pertinent to the weaving of a standard print cloth construction (80 x 80) having a common warp. The spinning performance of the blends of light spotted cottons were evaluated with an accelerated spinning test.

IMPROVING THE DIMENSIONAL STABILITY OF ACETYLATED COTTON PRODUCTS

Sloan, William G.; Tallant, John D.; and Hobart, Stanley R.

The dimensional stability of partially acetylated and fully acetylated yarns and fabrics have been improved by heat-stressing treatments which are described. Heat-stressing for as little as 30 seconds caused considerable reduction in elongation-at-break, a sharp increase in secant modulus, and more importantly considerable reduction in growth or permanent set after cyclic loading. Breaking strengths of the yarns and fabrics were not adversely affected by the heat-stressing treatment. Data are given for partially acetylated and fully acetylated yarns and fabrics after treatment at temperatures ranging from 100°C. to 245°C. and under loads up to 50% of breaking strength. Best results were achieved by heat-stressing for 30 seconds at 200°C. under a load equal to 20% of the breaking strength.

PROGRESS REPORT ON DEVELOPMENT OF AN ACCELERATED SPINNING AND BREAKAGE TEST

Louis, Gain L.

An accelerated spinning ends down technique to evaluate the spinning performance of cotton is under development based on the theory that too much or too little twist in yarns causes excessive end breakage during spinning. The technique calls for spinning selected yarn sizes in accordance with staple length of the cottons under higher than normal yarn tensions, using a series of low to high twist multipliers while maintaining a constant front roll speed. The relationship between end

* Cotton and Cordage Fibers Research Branch, Crops Research Division, ARS, USDA, Beltsville, Maryland

breakage and twist multipliers can be described by an up-turned parabolic curve. Pertinent information leading to the development of the technique is delineated. Limited data indicate that the technique has good sensitivity and reproducibility. This spinning technique indicates the relative level of end breakage and the probable optimum production spinning rate for different cottons, requires only small amounts of cotton, and is time saving.

EVALUATION OF PROCESSING PERFORMANCE AND YARN PROPERTIES OF COTTON TREATED WITH DIMETHYLOL ETHYLENEUREA

Ruppenicker, George F., Jr.; Brown, John J.; and Hoffman, Milton J.

Results are reported of an investigation to determine the general processing performance and yarn properties of cotton treated with dimethylol ethyleneurea. The resin-treated cotton was evaluated in 100% form and in blends with scoured cotton. Yarns spun from these blends were woven into fabric as filling using a common warp, and an assessment was made of the yarn and fabric properties relative to improved warmth. Difficulties were experienced in processing cotton containing large percentages of resin-treated fibers due mainly to uneven drafting and the formation of static changes during the carding and drawing operations. Yarns spun from cotton containing increasing percentages of resin-treated fibers became progressively weaker, lower in elongation, more nonuniform and degraded in appearance. Although experimental fabrics having improved warmth properties were made from yarns containing high percentages of resin-treated fibers, it was concluded that lower yarn quality combined with poor processing performance would make production on a commercial scale impractical.

THE EFFECTS OF VARIETY, ENVIRONMENT, AND GINNING PRACTICES ON THE SHORT FIBER CONTENTS OF AMERICAN UPLAND COTTONS

Grant, James N.; and *Barker, Henry D.

The percentages of fibers shorter than 1/2 inch are given for samples from sixteen varieties of cotton grown under wide ranges in environmental conditions. The quantity of short fibers was associated with the variety. However, the level of short fiber contents shifted with both growth areas and crop years. Environmental effects on short fiber contents are greater than the varietal effects. For a single variety the quantity of short fibers decreased as the fibers became more mature and coarser. As the quantity of short fibers increased, the Upper Quartile length decreased. The relation of short fiber content to strength is very poor. In a composite with samples of many varieties having wide ranges in fiber properties, the relationships of short fiber content to these fiber properties are extremely poor. Samples

* Cotton and Cordage Crops Fibers Research Branch, Crops Research Division, ARS, USDA, Beltsville, Maryland

known to have been ginned by commercial equipment with essentially no drying and lint cleaning had quantities of short fibers within the range for those ginned experimentally. The quantity of short fibers increased when the amount of drying and lint cleaning were increased. Short fiber in several samples rejected by mills as overdried and overcleaned were within the range of those ginned with adequate moisture and minimum amount of lint cleaning.

EFFECT OF COTTON FIBER STRENGTH UNIFORMITY ON OPTIMUM YARN TWIST

Weiss, Louis C.; Tsoi, Ruby H.; Sands, Jack E.; and Grant, James N.

The variation in the twist multiplier for maximum yarn strength in terms of the fiber properties of length, weight fineness, and uniformity of tenacity along bundle length is implied from data based upon 15/1, 30/1 and 40/1 yarns of a previously reported series of 43 cottons having different fiber properties. The optimum twist multipliers which were calculated from the above three fiber parameters; from the "J" factor; and also from the fiber length are compared to the optimum twist multipliers determined from the yarn tenacity vs. twist curves. The tenacity-length uniformity hypothesis and the Sullivan theory are compared by utilizing the single fiber properties of eight cottons. Considering numbers of samples, the correlation coefficients for the theoretical to nominal values of optimum twist range from a satisfactory 0.64 to a high 0.96. Possible utilization of the ratios denoting uniformity of tenacity along bundle length and the efficiency of single fiber tenacity transfer is further illustrated by their constructive inclusion in the tenacity-length uniformity hypothesis or the Sullivan analytical theory of yarn twist.

IDENTIFICATION AND PROPERTIES OF OIL CONTAMINATED COTTON

Honold, Edith; Andrews, Frederick R.; and Grant, James N.

Increased mechanization in the production and harvesting of cotton increases the possibility of the cotton becoming contaminated with machinery lubricants. A simple and rapid test is described to detect the presence of oil on seed cotton or on cotton lint even after the oil has been thoroughly diffused throughout the cotton by mechanical processing. The test is based on the fluorescence under ultraviolet light of a Skellysolve B extract of the oil. Oily cotton has poor processing qualities and, if the lint is heated sufficiently to vaporize the oil, has still poorer qualities unless the cotton is permitted first to regain its normal moisture content. The processing of oil-contaminated cotton is improved by blending with uncontaminated cotton.

EFFECTS OF COTTON STRUCTURE ON FIBER AND YARN PROPERTIES

Weiss, Louis C.; Orr, Rollin S.; Redmann, Jerome J.; and Grant, J. N.

Cotton samples with a wide range in fiber properties were chosen. An x-ray measure of the degree of crystallite orientation and/or the secant modulus of fifteen cottons are traced through levels from subfibers to

single fibers to bundles to yarns. The differences due to sample characteristics minimize gradually while going through these levels. When the secant modulus of the yarns spun at the appropriate twist for maximum strength is referred to the x-ray measurement, no additional masking, but resolution occurs. The resolution seems to be more pronounced with American upland than with barbadense cottons. Several physical properties are examined for clues to detect such possible family behavior. No one fiber property was completely satisfactory. However, several promising ones are presented. Tenacity, secant modulus, or weight fineness (center) primarily explain the rankings. The efficiency of tenacity transfer and the uniformity of tenacity with test length are useful in detecting the secondary resolution.

STRUCTURAL PATTERNS IN CELLULOSE FIBERS

Tripp, Verne W.; Zarins, Zigrida M.; Moore, Anna T. and deGruy, I. V.

The disposition of the cellulose in eight natural fibers (cotton, flax, ramie, hemp, jute, kenaf, abaca, and sisal) and four regenerated filaments (tire yarn and textile viscose rayons, Fortisan and Fortisan 36) was examined by light and electron microscopy. The native celluloses are characterized by well-defined fibrillate arrangements, with their microfibrils laid down in concentric lamellae. The native microfibrils which compose each lamella are highly parallelized and orientated in the direction of the fiber axis. The fibrillate character of the regenerated celluloses is not as apparent as that of the native fibers, and viscose rayons display significant amounts of poorly orientated material. The lateral dimensions of the microfibrils in the native celluloses are astonishingly uniform. The microfibrils are approximately 150 Angstrom units wide and 50 Angstrom units thick. Regenerated microfibrils are several times this size. Attack on the native microfibrils by mineral acids does not significantly diminish their lateral dimensions, but greatly shortens their length.

THE EFFECT OF THE SHORT FIBERS IN A COTTON ON ITS PROCESSING EFFICIENCY AND PRODUCT QUALITY. PART III. PILOT-SCALE PROCESSING OF YARNS

Tallant, John D.; Fiori, Louis A.; and *Schultz, E. Fred, Jr.

**Alberson, David M.; and **Chapman, Walter E.

By differentially ginning a single lot of Acala 44 cotton, various short fiber content levels were obtained. Yarns produced from these cottons showed the effects of increases in short fiber content; namely, reduced strength, elongation and appearance. The twist required for maximum strength was found to be largely unaffected by changes in short fiber content except for a medium yarn number for which a relationship was

* Biometrical Services, ARS, USDA, in cooperation with the Southern Division.

** USDA Ginning Laboratory, Agricultural Engineering Division, ARS Mesilla Park, New Mexico

demonstrated. A graph showing the close relationship between the percentage of fibers less than $3/8$ inch and those less than $1/2$ inch calculated for a wide number of cottons is included. Spinning efficiency is shown to be adversely affected by increases in short fiber content. An appendix gives the statistical background to the development of a 720-hour abbreviated spinning performance test.

ACCEPTED FOR PUBLICATION

OPTIMUM ALLOCATION OF DRAFT BETWEEN PROCESSES FOR CARDED LONG STAPLE COTTON

Simpson, Jack; Callegan, Arsema T.; and Sens, Charles L.
Textile Inds., Accepted.

Results are reported of an investigation to determine the optimum draft allocation between processes from picking through spinning when processing long staple cottons. It was found that the long staple cottons were more sensitive to draft allocations prior to spinning than the medium and short staple cottons of previous investigations. In general, a light weight (45 grains/yard) card, first and second drawing sliver produced the most uniform roving. The investigation showed also, that drafts up to 35 can be employed with the long-draft system, when spinning medium and fine yarns (40/1, 60/1 and 70/1 - 15, 10 and 8 tex) without significantly lowering yarn uniformity and strength.

ADD CLEANING TO YOUR SRRL COTTON OPENER

Mayer, Mayer, Jr.; and Kotter, James I.
Textile Inds., Accepted.

Research at the Southern Regional Research Laboratory on improved methods and machinery for cleaning cotton in textile mills has resulted in the development of an Aerodynamic Cleaner for attaching to SRRL Cotton Openers. Attachment of the Cleaner to existing Openers will result in approximately 20 percent increase in opening line cleaning efficiency without adversely affecting fibers or yarns. The Aerodynamic Cleaner has no moving parts and is relatively simple to install and operate.

NEW EQUIPMENT FOR OPENING AND CLEANING COTTON

Rusca, R. A.
International Yearbook of the Cotton Trade Journal, 1960. Accepted.

The purpose, general design, and performance of the SRRL Opener-Cleaner and the SRRL Aerodynamic Cleaner are briefly discussed. Mill installations show the former removes 25% to 35% of the trash in cotton, and the latter from 10% to 15% trash.

TEN YEARS OF MACHINERY DEVELOPMENT RESEARCH AT THE SOUTHERN REGIONAL RESEARCH LABORATORY

Rusca, R. A.

Textile Inds., Scheduled for Publication, March 1961

The paper reviews the Laboratory's developments in the field of textile machinery and apparatus for the period of July 1, 1950 to June 30, 1960. Fifteen cleaning, carding, slashing, weaving, miscellaneous apparatus developments and four basic research studies are briefly described. The commercial status of each is given; seventy patent licenses have been issued to thirty-four firms to manufacture the various machines.

MILL REPORTS ON THE SRRL GRANULAR CARD

Rusca, R. A.; Miller, A. L.; and Brown, R. S.

Textile Bull., Scheduled for Publication, March 1961

The cotton textile industry is evaluating the SRRL Granular Card on a wide scale. Detailed reports are presented from three mills processing coarse, medium-coarse, and medium yarns, respectively, and general statements from seven other mills. The findings indicate savings of 1 to 4 percent card waste, without affecting processing efficiency or yarn quality. Granular carding appears more suitable of coarse and medium yarns than for fine yarns.

BLENDING COTTONS DIFFERING IN FIBER BUNDLE BREAK ELONGATION: PART I. EFFECT ON THE PROPERTIES OF SINGLE YARNS

Louis, Gain L.; Flori, Louis A.; and Sands, Jack E.

Textile Research J., Scheduled for Publication, February 1961

Two cottons, differing in fiber bundle break elongation but having other pertinent fiber properties substantially equal, were blended in different percentages to permit a study of the effects of break elongation on yarn properties and spinning efficiency. Yarn strength and elongation were affected by fiber bundle break elongation in proportion to the percent of constituents in the blends, with fibers having the highest fiber bundle break elongation exerting the greatest influence. Furthermore, nep formation increased linearly as the percentage of higher elongation cotton increased in the blend, indicating that neps are directly influenced by average fiber stiffness. It was also found that yarn toughness index correlated closely with yarn impact data, thus suggesting its possible substitution for yarn impact data. This study showed that properties of warp and filling yarns, especially the elastic properties, obtained from the sized warp and the rewound filling quills are more indicative of the properties of the resultant fabric than yarns taken directly from spinning bobbins. The inconsistency of end breakage of the warp and filling yarns during spinning offered no conclusive evidence as to the relative spinnability of the cottons and cotton blends investigated.

VARIABILITY WITHIN SORTED SUTER-WEBB LENGTH GROUPS AND THE PRECISIONS
OF LINEAR DENSITY DETERMINATIONS

Flori, Louis A.; Sands, Jack E.; Louis, Gain L.; and Tallant, John D.
Textile Research J., Scheduled for Publication, February 1961

Data were presented to show that the errors in linear density determinations resulting from faulty arraying was relatively small. Also, it was found that average of differences in linear density between pairs of length groups was either statistically significant or highly significant. Furthermore, data show that the chances are less than 1 in 100 that operators would diverge by 1 ug/in. even in the least accurate determination of fiber fineness by the Suter-Webb array method.

PROGRESS REPORT ON DEVELOPMENT OF AN ACCELERATED SPINNING END BREAKAGE
TEST

Louis, Gain L.
Textile Inds., Accepted.

An accelerated spinning ends-down technique to evaluate the spinning performance of cotton is under development, based on the theory that too much or too little twist in yarns causes excessive end breakage during spinning. The technique calls for spinning selected yarn sizes in accordance with staple length of the cottons under higher than normal yarn tensions, using a series of low to high twist multipliers while maintaining a constant front roll speed. The relationship between end breakage and twist multipliers can be described by an up-turned parabolic curve. Pertinent information leading to the development of the technique is delineated. Limited data indicate that the technique has good sensitivity and reproducibility. This spinning technique indicates the relative level of end breakage and the probably optimum production spinning rate for different cottons, requires only small amounts of cotton, and is time saving.

BLENDING COTTONS DIFFERING IN FIBER BUNDLE BREAK ELONGATION: PART II.
EFFECT ON PROPERTIES OF A COMBED BROADCLOTH

Louis, Gain L.; Flori, Louis A.; and Sands, Jack E.
Textile Research J., Accepted.

Two control cottons, differing in fiber bundle break elongation but having other pertinent fiber properties essentially equal, were blended in different percentages, spun into warp and filling yarns, woven into a standard combed broadcloth, and then finished commercially. This report discusses the physical properties of these fabrics. Two cottons having significant differences in fiber break elongation show very little difference in fabric break elongation, indicating that the influence of fiber elongation gradually becomes less evident during successive fabric finishing processes. In general, the high-elongation fiber cotton produces fabric of superior qualities, viz., breaking and tearing strengths, elongation, and flex resistance, when compared with fabric made with low elongation fiber cotton. Furthermore, data also indicate that the values of fiber properties of the blended lots cannot be predicted from those of

the controls when the fabrics are subjected to various chemical treatments. This report corroborates other findings that no apparent advantage exists in blending low and high fiber elongation fibers--whether in blends of natural-natural or natural-synthetic fibers--from the standpoint of textile quality.

FEASIBLE TECHNIQUES FOR PRODUCING PARTIALLY ACETYLATED COTTON FABRICS

Sens, Charles L.; Sloan, William G.; and Cooper, Albert S., Jr.
Textile Inds., Accepted.

Investigations were conducted to determine the optimum percentage of partially acetylated (PA) cotton to blend with untreated cotton for processing into yarns and fabrics. It was found necessary to use a blend of 70% PA and 30% untreated cottons to obtain relatively good heat resistance and mechanical processing. This blend was processed into a fabric for comparison with other fabrics produced from acetylated roving, acetylated yarn and acetylated fabric. These comparable fabrics were evaluated by physical property measurements before and after heating for various periods at 160°C. to determine at what stage of mechanical processing acetylation should be performed. On the basis of these simulated service tests, fabrics acetylated in fabric form or as yarn were slightly better than the fabric produced from acetylated roving and considerably better than the fabric produced from a blend of acetylated and untreated cotton. While various techniques for acetylating raw stock, roving and yarn have been developed on a pilot-plant scale, fabric acetylation is still preferable from a commercial standpoint. However, many industrial fabrics are either too tightly woven or too wide for acetylation as piece goods. For these types of fabrics, acetylation in yarn form would be the preferred method of treatment.

EFFECTS OF TENSION DURING RESIN TREATMENT ON PHYSICAL PROPERTIES OF COTTON FIBERS AND YARNS

Orr, Rollin S.; Burgis, Albert W.; and Grant, James N.
Textile Research J., Accepted.

The effects of tension during resin treatment on the physical properties of yarns and fibers from the yarns were investigated on several cotton samples. The resin applied were of the melamine-formaldehyde and dimethylolethyleneurea types. The strength loss from slack treatments was the result of crosslinking of the internal fiber elements in unfavorable positions for stress equalization. Acid degradation was a factor in certain treatments. Low tensions during the treatment were sufficient to prevent much of the strength loss. As elongation was reduced by tension, the energy to rupture was not greatly changed. The selection of high strength, high elongation cottons, and premercerization increased the toughness. Tension before and during drying, followed by low tension during the cure, minimized the losses of toughness in yarns.

SOFTNESS OF COTTON YARNS AS AFFECTED BY FIBER AND YARN PROPERTIES

Honold, Edith; and Grant, James N.

Textile Research J., Accepted.

Yarn softness is evaluated quantitatively as the percent increase in yarn width under a definite lateral force. Single-yarn softness decreases with twist and increases with a yarn number and fiber maturity. With the above parameters constant, softness has no relation to fiber weight fineness. An equation is developed for estimating single-yarn (S twist) softness from yarn diameter and twist, and fiber maturity. The softness of 2-ply yarns (Z/S) as related to the component single yarns is discussed. For modified cottons, increased fiber friction apparently contributes to the decrease in yarn softness. An equation is developed to estimate the single-yarn diameter from yarn number and twist multiplier. The possibility that the diameter of the 2-ply yarn is related mathematically to the ply yarn twist multiplier and to the softness of the original unplied single yarn is discussed.

PUBLISHED PAPERS

Machinery

2048. EQUIPMENT COSTS

Decossas, K. M.; Koltun, S. P.; and Patton, E. L.
Chem. Eng. Progr. 56, (12): 60-63. 1960

Agricultural utilization research is offering industry numerous processes for producing new and improved products from cotton oil-seeds, citrus, pine gum, rice, and other farm commodities. These processes are comprised of a variety of unit operations, and have been evaluated over a wide range of productions based on both hypothetical and commercial operations. Equipment costs, largely obtained from equipment manufacturers during the past six years, and used in the process evaluations, have been adjusted to the December 1959 level, classified for the various equipment units by material of construction and size, charted, and are presented for quick reference and use.

2015. RECENT IMPROVEMENTS IN TEXTILE PROCESSING MACHINERY AND METHODS

Rusca, R. A.
Textile Research J. 30: 685-91. 1960

Recent developments by the Southern Regional Research Laboratory in the field of cotton textile processing machinery and methods are presented. Research on blending mature and immature cotton, the effect of short fiber content on processing efficiency and product quality, the SRRL Opener-Cleaner and the Carding Cleaner, and the new SRRL Granular Card are discussed. A plan is outlined for future research directed toward the development of a completely new method of manufacturing textiles that should materially improve quality and lower cost of cotton products.

2013. CLEANING COTTON BY AIR

Hetherwick, Roy A.; and Weller, Heber W.
Textile Inds. 124, (10): 163-65. 1960

Research at the Southern Regional Research Laboratory on an improved system for cleaning cotton in textile mills has resulted in development of an aerodynamic type cleaner for use with the SRRL Opener-Cleaner. The new cleaning unit increases the cleaning efficiency on the Opener-Cleaner by one-third without adverse effects on fibers or yarns. The unit adds little to the original cost of the Opener-Cleaner, but does require a greater air supply than that available from conventional textile mill condensers with integral fans.

14.

1996. THE SRRL GRANULAR CARD

Rusca, R. A.

Can. Textile Seminar. Book of Papers 7, 69-72. 1960

Fundamental investigations at the Southern Regional Research Laboratory of the aerodynamics of cotton cards revealed that carding is a mechanical action, with air forces playing a very minor role. Data are presented on air pressures at strategic points with the card idling and processing cotton. The studies led to the development of a method of carding whereby the conventional revolving flats are replaced with a nonmoving, rigid granular surface that eliminates all flat waste. Design details and comprehensive pilot-scale evaluations of the Granular Card are discussed in full. Experimental installations of 1 to 8 converted cards are being evaluated by about 60 mills. Results are presented on the performance of Granular Cards in mills processing coarse, medium, and fine yarns.

1839. SRRL GRANULAR CARD - INSTALLATION MANUAL

Miller, A. L.; Brown, R. S.; and Rusca, R. A.

ARS 72-16, 9 pages. 1959

The SRRL Granular Card, developed at the Southern Utilization Research and Development Division, ARS, USDA. The Granular card is a mechanism for converting revolving flat cotton cards to carding without flats, thereby eliminating all flat waste. On an average, over-all card waste is reduced about 50 percent, amounting to a saving of 2 to 3 percent of the total cotton processed. At the same time, neps are reduced slightly. Lower processing costs and improved quality of the textile products should increase the utilization of cotton. The carding apparatus is simple insofar as number of parts and intricacy of mechanisms are concerned, however, the importance of dimensional trueness in manufacture, and exactness in erection cannot be overemphasized. The engineering drawings issued by the Department of Agriculture show the dimensional tolerances that cannot be exceeded except at the risk of lowering the performance of the machine. Proper erection of the apparatus, whether by the manufacturer or the mill, is equally important, and it is for this reason that this illustrated publication of a recommended procedure is issued.

1804. AIR-BRUSH DOFFER

Mayer, M., Jr.; and Kotter, J. I.

Textile Ind. 123, (8) 123-24. 1959

Research on the development of a cleaning attachment for the SRRL Cotton Opener has led to a new type doffer for removing the cotton from the processing cylinders of the machine. Designed and used as an integral part of the cleaning attachment, this efficient means of doffing has promise for use in other machinery

applications. The design of the new air-brush doffer is similar to a centrifugal blower, with brush sticks functioning as the blower blades. The doffer combines air blast with mechanical brush actions to efficiently open, doff, and supply the air necessary for conveying textile fibers to a subsequent process.

1810. DESIGN OF THE SRRL GRANULAR CARD

Miller, A. L.; and Brown, R. S.

Textile Research J. 29, 733-36. 1959

Excerpt published: Textile World 109, 45-46. 1959

A detailed, illustrated description is presented of the mechanical apparatus which replaces the revolving flat assembly on a cotton carding machine with a nonloading mechanism and eliminates the flat strips. The apparatus is simple; however, experience has shown that close adherence to the fabricating tolerances and installation adjustments is essential for proper performance. In addition to discussing the design and advantages of carding without flats, the theory, design, and results of a low pressure lickerein cover and a preopener roll applicable to standard cards is presented.

1830. A NEW WARP TENSION CONTROL DEVICE AND ITS APPLICATION

Louis, Gain L.; and Longworth, Richard L.

Textile Bull. 85, (8) 55-56. 1959

The SRRL tension control device has proved to be a useful tool for research purposes, and it may have merit for controlling warp tension in the commercial production of high-count, hard-to-weave fabrics. Full details and engineering drawings of the device are available without charge from the Southern Regional Research Laboratory, Post Office Box 19687, New Orleans, Louisiana.

1829. NEW TEXTILE CARD ROOM EQUIPMENT - AND A PLAN FOR THE FUTURE

Rusca, Ralph A.

J. Textile Inst. 50, p 360- p 377. 1959

Research of the U. S. Department of Agriculture to develop new and improved cotton textile processing methods and equipment is briefly discussed. Design and performance data are presented on two new machines: the SRRL Opener-Cleaner, a 1600 pound per hour blowing room machine that removes one-third of the trash in cotton with minimum loss of fiber in the waste and the SRRL Flatless Card, a radical but simple modification of the carding engine that eliminates conventional revolving flats and flat strips and reduces nep count in the web. A program of research for the future is suggested which should lead to the development of a completely new concept and of equipment for processing cotton into substantially higher quality textile products at one-half existing processing costs. A plan of work is outlined for five

to ten years fundamental research, followed by five to ten years of engineering, development, and evaluation activities.

1645. CARDING WITHOUT FLATS--A REPORT ON THE SRRL CARD
Rusca, R. A.; Miller, A. L.; and Brown, R. S.
Textile Research J. 28: 597-99. 1958

An apparatus has been developed for converting conventional cards to carding without revolving flats. The device is simple, relatively inexpensive and effective. It eliminates all flat waste, reduces dust and fly, decreases maintenance and materially decreases the weight of the card. Evaluations of the apparatus under pilot-plant conditions show reductions of 50 to 75% in overall card waste, about the same nep count, and slightly more uniform sliver when compared with a conventional card in excellent condition. On the same card equipped with flats and without flats, waste is reduced 50%, neps about 30%, yarn strength is 2% less and yarn uniformity is the same. The apparatus appears to perform equally well on short, medium and extra-long staple American cottons. It is anticipated that design details of the SRRL Carding Apparatus will be publicly available within the year.

1573. AN INVESTIGATION OF AIR PRESSURES IN THE COTTON CARD
Miller, A. L.; Brown, R. S.; and Rusca, R. A.
Textile Research J. 28; 593-96. 1958

An investigation is reported of the air pressures in the conventional cotton card, measured at strategic points with the card running idle and when processing cotton. Through the utilization of a sensitive electronic instrument capable of measuring pressures of .001 inch of water, both static and velocity determinations were made that have given an insight into the function of air in the card and have led to the development of a method of carding without the use of the conventional revolving flats.

1656. AN INVESTIGATION OF POWER REQUIREMENTS FOR COTTON CARDING
Miller, A. L.; and Brown, R. S.
Textile Bull. 84 (9): 99, 102, 104-06. 1958

No attempt will be made to indicate dollar savings that can be realized through power reduction at the card, however, if operating personnel are made just a little more conscious of the factors that tend to consume power, a saving is almost sure to follow. The major factors for reducing power consumption can be summed up as follows: (1) Reduce friction by maintaining a proper lubricating schedule with the proper lubricants, in accordance with the manufacturer's recommendation; (2) Avoid unnecessary friction by maintaining proper clearances to prevent rubbing of moving parts; (3) Avoid unnecessary bearing friction by repairing scarred journals and worn bearings, and by periodically cleaning bearings. Also by maintaining proper alignment of bearings, particularly the

adjustable ones, such as on the shaft that drives the feed roll, and on the doffer comb; (4) Use roller bearings on ball bearings wherever possible in lieu of sleeve type bearings; (5) Use a longer starting period if necessary to reduce initial electrical overload.

1574. MACHINE REMOVES ONE-THIRD OF THE TRASH

Rusca, R. A.; and Wallace, E. F.

Textile Ind. 124 (4): 145-56. 1958

Essentially the SRRL Opener-Cleaner is the SRRL Opener plus a build-in cleaning mechanism. Evaluations of the Opener-Cleaner under pilot scale conditions indicate that it removes an average of about one-third of the trash in cotton, depending upon the type of cotton and trash, at a production rate of 1500 pounds per hour. A schematic diagram of the machine, and tabulations of cleaning efficiency and waste analysis and length analysis of fiber content of the waste are included.

1508. THE SRRL INTEGRATED SYSTEM FOR OPENING AND CLEANING COTTON--THE OPENER-CLEANER

Rusca, R. A.; and Young, R. C.

Textile Research J. 27: 558-64. 1957

An integrated system for cleaning cotton at textile mills is under development at the Southern Regional Research Laboratory. The theory and general design of the system and of one of its component machines, the Opener-Cleaner, are discussed. The results of laboratory evaluations, using five commercial varieties of cotton, are presented. Comparisons of the processing performance of a conventional opening-picking line and an experimental line with the Opener-Cleaner are favorable to the experimental line. The Opener-Cleaner, alone, provides 35% cleaning efficiency and 0.3% lint loss at 1500 lbs/hr. production.

1507. THE SRRL INTEGRATED SYSTEM FOR OPENING AND CLEANING COTTON--THE CARDING CLEANER AND THE INTEGRATED UNIT

Kyame, George J.; and Latour, William A.

Textile Research J. 27: 566-70. 1957

The changes made in a conventional one-process picker to convert the unit into a commercial size Carding Cleaner are described. The results of pilot scale tests of the machine in an experimental line are compared with those of a control line composed of conventional textile mill equipment. The data presented shows that the carding cleaner line achieved an average cleaning efficiency of about 59% at a production rate of 435 lbs./hr. as compared with the control line which achieved 35% cleaning at 356 lbs./hr. Lint losses are 1/3 to 1/2 of those observed in the control line. Also presented are data obtained in preliminary tests of a tentative integrated cleaning system compared to the

SRRL Opener-Cleaner and the SRRL Carding Cleaner. Nearly 82% cleaning with a lint loss of 0.70% was achieved in the integrated system as compared with 52% cleaning and 1.14% lint loss for the control line.

1278.1 AN INTEGRATED SYSTEM FOR CLEANING COTTON AT TEXTILE MILLS

Rusca, Ralph A.

Textile Ind. 120 (1): 108-9. 1956

The plan for development of an integrated system for cleaning cotton is outlined. In such a system the function of each machine would be integrated and synchronized with all the others. Some of the machines discussed are: The Opener-Cleaner, the Aerodynamic Cleaner, and the Carding Cleaner. A plant layout is given. If successful, the system would be capable of removing 75-90% of the trash from about 100,000 lbs. of cotton in a 40-hour shift.

1278. SRRL LOOM ATTACHMENT MAKES WEATHERPROOF FABRICS

Mayer, M., Jr.

Textile World 106 (4): 126-27, 200, 202, 204. 1956

The SRRL loom attachment for weaving high-pickage fabrics has been improved to make it adaptable for several types of loom, and it can be powered with an overhead drive in addition to the cam drive. Results of five-year service tests on tarpaulins woven with the attachment and used as athletic field covers show that although the fabric wets immediately, leakage occurs at 54 cms. hydrostatic pressure, against 56 cms. for unexposed fabric. Tables show physical properties of several high-pickage fabrics woven with the attachment, physical properties during the five-year test, and comparison with a regular tarpaulin before and after six months' exposure.

1150. THE SRRL CARDING CLEANER

Kyame, G. J.; and Mayer, M., Jr.

Textile Research J. 25: 476-80. 1955

A detailed description is given of an experimental machine intended to meet the problem of cleaning created by mechanically harvested cotton. The machine is somewhat similar to a down-stroke buckley-type cleaner, but the customary beater is replaced with a lick-in type of carding cylinder. Also described is an improved feed system using a novel type of roll, called an "anti-pluck" roll. The new feed roll permits rapidly advancing a relatively thin layer of cotton to the carding cylinder, while simultaneously resisting the effects of the carding cylinder to pull away the cotton. This results in opening the cotton to such a degree that cleaning efficiencies as high as 60-68% in a single machine are feasible at production rates of 400 lbs. per hour. Data are presented to show the performance achieved in a quarter-size experimental machine.

995. THE RETRACTO-PIN CONTINUOUS CARD STRIPPER

Rusca, R. A.; and Pettit, G. A.

Textile Research J. 24: 539-40. 1954

Also published as:

NEW CONTINUOUS STRIPPER MAY CUT CARD WASTE 1%

Textile World 104 (4): 80, and

RETRACTO-PIN CONTINUOUS CARD STRIPPER

Textile Ind. 118 (4): 181-82. 1954

Because commercially available continuous card strippers would not be satisfactory for stripping the card when it is unusually heavily loaded, a new type of stripper has been developed. Promising as a practical aid to the textile industry in processing raw cotton, it is still an experimental device, and test results are preliminary and incomplete. A small rotor traverses and strips the card cylinder of impacted fibers through a slot in back plate. Small-diameter pins or wires remove impacted cotton from the card clothing, and a combination of mechanical forces and self-generated air currents return these strips to the surface of the cylinder. The rotor is driven directly from the card by means of spinning frame tapes, and the slot in the back plate is sealed by a sliding metal strip.

993. TRY THIS APRON-SPLICING JIG

Pettit, G. A.

Textile Ind. 118 (3): 138. 1954

A simple, easy-to-use, small jig makes a smooth, even, and pliable splice when replacing leather aprons on long-draft spinning frames --by holding the apron ends in alignment and applying pressure to the glued area while splicing the apron directly on the frame. The jig is readily adjusted preparatory to making the splice and quickly detached afterwards.

930. MILL REPORTS ON THE SRRL OPENER

Rusca, R. A.; and Young, R. C.

Textile Ind. 117 (7): 87-90. 1953

The operating principle and laboratory performance of a new textile-opening machine developed at the Southern Regional Research Laboratory has been described in an earlier paper. Experiences with SRRL-type cotton openers under representative mill conditions during the past two years are reported. These indicate that the machine is a worth-while investment. When properly installed and operated, the opener has proved to have no effect on fiber length or nep count. It produces an exceptionally well-opened and blended stock. Trash removal by standard textile cleaning equipment is facilitated, and the amount of spinnable fiber in the opening-picking waste is reduced.

639. SRRL OPENER GIVING GOOD RESULTS: NEW CLEANER BEING DEVELOPED
 Rusca, Ralph A.
 Textile World 103 (5): 135. 1953

Performance of the SRRL Opener in full scale operation at commercial mills is described. One of these mills is reported as saving \$22,400 a year with the Opener. A cleaner designed to be operated in conjunction with the Opener is under study. The goal of cleaning research is removal of 50% trash in a single operation, at 3,000 lbs. per hour, with less than 5% fiber loss.

- 864.1 THE SRRL OPENER
 Rusca, R. A.
 Textile Bull. 79 (5): 80-81. 1953

Increasing use of mechanical harvesting by cotton growers makes cleaning efficiency in the mill a necessity. Development of the SRRL Opener is the first step in a research program to improve cleaning of cotton in the mill by opening the cotton and making it more accessible for removal of dirt and trash. The Opener is reported to turn out lint 25% more open than when it was baled at the gin. Operation of the Opener is described and mill performance records reported.

792. IMPROVE YOUR FABRICS--WITH THE SRRL LOOM ATTACHMENT
 Mayer, M., Jr.; Kyame, G. J.; and Brown, J. J.
 Textile World 102 (7): 114-15. 1952

This Laboratory, using a German weaving device as a basis, produced an inexpensive loom attachment to weave lightweight cotton fabrics that are almost waterproof; fabrics of a uniform quality having a few reed marks; and fabrics of increased breaking strength. Pickage can be increased as much as 38% above normal. The principle of the attachment follows the pattern of the well-known method of raising the level of the warp line where additional tension is applied to a part of the warp at the beat-up.

711. EXPERIMENTAL SLASHER FOR TEXTILES EMPLOYS GAS, INFRARED DRIER
 Kayme, George J.
 Ind. Gas. 30 (10): 12-13, 31-32. 1952
 Also published as:
 SLASHER DRYER USING GAS DEVELOPED AT SRRL
 Textile World 102 (8): 143-44. 1952
 INFRARED DRYING UNIT FOR SLASHER
 Textile Ind. 116 (11): 132-33.
 Condensation: A GAS-FIRED, INFRARED DRIER FOR SLASHING
 Textile Age 16 (3): 68-69. 1952
 Also in Ind. Heating. July 1273-74, 1276, 1278, 1280. 1952

This gas-fired, infrared drier, for use in a textile slasher, is an elongated, double-walled structure, which in longitudinal cross

section resembles a smoker's pipe. Four burners provide control over the intensity of the infrared radiation reaching the warp. It is possible that the unit, which is patented, may be the basis of low-cost, high-production slashing equipment. In a mill, 4 such driers, each 57 inches wide, might consume about 125,000 cu. ft. of gas per 24-hour day for drying sized warps. Engineering details may be obtained by writing the Southern Regional Research Laboratory.

524. PRECISION PICKER KNOCK-OFF DEVELOPED AT SRRL

Pettit, George A.

Textile World 101 (2): 153. 1951

A precision knock-off motion for attachment to a conventional cotton textile picker is described. The attachment has been in operation for more than a year and has proved a worth-while development for research laboratories and other organizations which must prepare picker laps of any specified lengths from 4 to 40 yards.

527. AN EXPERIMENTAL, GAS-FIRED, INFRARED TEXTILE SLASHER

Rusca, Ralph A.; and Kyame, George J.

Textile Research J. 21: 445-50. 1951

An experimental, gas-fired, infrared textile slasher designed by the textile engineers of the Southern Regional Research Laboratory is described. The slasher processes warps 21 in. wide on beams with 18 in. heads, and is used in operations of pilot-plant scale. Among the features which represent departures from conventional methods of textile slashing are a new system for the preparation and distribution of the sizing material; a new and more flexible design of size box; an improved means for drying the size-impregnated warp, which combines the best features of radiant and convection drying methods; and a sensitive drive system capable of controlling the warp tension during processing.

526. THE SRRL-TYPE COTTON OPENER

Rusca, Ralph A.; Young, R. C.

Textile Ind. 115 (5): 107-11. 1951

The wide adoption of machine picking, which produces cotton of higher trash content, as well as the normal supply of low grade hand-picked cottons, emphasizes the need for new and improved methods of cleaning at textile mills. A machine for opening and fluffing up cotton to enable better cleaning by equipment already in the mills has been developed. The opener has been evolved from the feeder of cotton-cutting equipment designed by the Southern Laboratory during the war to permit the use of lint cotton in manufacturing gunpowder. Experimental results

on commercial cottons with the new opener indicate a worth-while saving in spinnable fiber and the production of cleaner picker laps. It is recommended that the opener should be installed in the mills at the end of the feed table from the blending hopper feeders. The design principles, engineering features, and performance data of the new opener are presented in detail.

473. CONVERSION OF THE SACO-LOWELL SLIVER TESTER TO ELECTRICAL RECORDING

Rusca, Ralph A.

Textile Research J. 20: 780-86. 1950

Also published as:

CONVERTED SLIVER TESTER SPEEDS EVENNESS ANALYSIS

Textile World 101: (1): 120-21. 1951

The usual recording chart of a Saco-Lowell sliver tester has been replaced by a series of electrical contacts over which the recording arm passes in accordance with the thickness of the sliver. The instrument is described, illustrated, and the theory and mechanics involved in its construction are discussed. The converted sliver tester has been used successfully at the Southern Regional Research Laboratory for more than a year in textile research applications.

575. PROBLEMS OF MACHINE PICKING

Rusca, Ralph A.; and *Bennett, Charles A.

Yearbook Agr. (U. S. Dept. Agr.) 1950-51: 441-44

Problems at the gin and at the textile mill introduced by the mechanical harvesting of cotton are enumerated and discussed. Some of the Department's research to solve these problems is presented, with particular reference to new methods of lint cleaning for gin use and opening equipment for mill use.

577. BETTER WAYS TO HANDLE THE BALE

Sens, Charles L.

Yearbook Agr. (U. S. Dept. Agr.) 1950-51: 445-52.

Progress in improving cotton textile machinery and processing techniques is reviewed. The principal developments have been one-process picking, high-draft roving and spinning, high-speed warping, hot-air slasher drying, weaving without shuttles, production of nonwoven fabrics, continuous process bleaching, and organized control of techniques. As a result, efficiency in operation has been increased; quality in most cases has been improved; and the all-important factor of relatively lower costs of manufacturing has been coped with successfully. Such developments support the cause of conducting research to strengthen the competitive position of cotton and extend its end uses.

* Cotton Ginning Laboratory, Dept. of Agr., Stoneville, Miss.

433. CARD-FLAT SETTINGS INDICATED BY DIAL GAUGES

Bogdan, J. F.

Contractor: North Carolina State College, Raleigh, N. C.Textile World 99 (10): 172. 1949

A quick method for gauging the settings of ward-flats to the cylinder has been worked out. The method greatly reduces the time required for this adjustment, and is especially useful in pilot-plant work, where many changes must be made. Equipment and its operation are described in the illustrated article.

435. MINIATURE SLASHER DEVELOPED AT N. C. STATE

Shinn, W. E.; and Sink, C. Boyce

Contractor: North Carolina State College, Raleigh, N. C.Textile World 99 (8): 122-23, 210, 212. 1949

A slasher is described which is of a size small enough for use in pilot-plant and experimental work. The machine is built for processing a sheet of yarn seven inches wide under conditions similar to those of the full-sized mill operation. Pictures of the machine, drawing, and detailed description are given in the publication.

115. LABORATORY CUTTER FOR CLOTH STRIPS

Kettering, James H., and Cooper, Albert S., Jr.

Am. Dyestuff Repr. 34: 249. 1945

A device used at the Southern Regional Research Laboratory for cutting cloth into strips of predetermined width and winding them into rolls is described. The device consists of a number of electric scissors mounted between suitable tension bars so a platform with a motor, speed-reducer, and windup beam.

Fiber Properties (Related to Processing
Efficiency and Product Quality)

2059. THE EFFECT OF YARN PROPERTIES AND FABRIC STRUCTURE ON THE GRAB BREAKING STRENGTH OF FABRICS--A STATISTICAL EVALUATION

Sands, Jack E.; Little, Herschel W.; Fiori, Louis A.; and
*Faught, William A.

Textile Inds. 125 (1): 52-54. 1961

Skein and grab breaking strength data and certain elements of fabric construction which were derived from an analysis of 145 fabric structures, including plain, twill, sateen, and oxford weaves, and which were developed under another study, were analyzed. A number of simple correlations were tried which did not yield any coefficients of merit for further consideration. Multiple correlations were made based on the multiple regression effects of yarns per inch, yarn number, skein breaking strength and yarn crimp or grab breaking strength. Regression equations, based on these factors, were developed for both warp and filling directions and these for both plain woven fabrics only and for all fabrics on which necessary data were available. In three of these four cases, yarns per inch ranked most important. Yarn number ranked second in both warp and filling directions for the plain weaves, but third for all weaves. Skein breaking strength ranked first in importance for filling yarns for all weaves, second for warp yarns and all weaves, and third for both warp and filling for plain weaves. Yarn crimp was the least important in all cases.

2050. BLENDING COTTONS DIFFERING WIDELY IN MATURITY. PART II: EFFECT ON THE PHYSICAL PROPERTIES OF A SHEETING FABRIC (TYPE 128)

Fiori, Louis A.; Louis, Gain L.; and Sands, Jack E.

Textile Research J. 30, 926-33. 1960

This investigation compares properties of a Type 128 sheeting woven with yarns spun from a blend of fibers differing widely in fiber fineness with comparable properties of a similar sheeting woven with yarns spun from a control cotton of the same average fineness. The data demonstrate that blending fine with coarse fibers in proportions of 60% to 40% does not detrimentally affect the important physical properties of grey, bleached, and bleached and dyed fibers. Commercial acceptability evaluations showed that, in general, marketable bleached materials can be manufactured from a blend of extremely fine and coarse fibers. The dyed fabrics

* Marketing Economics Research Division, Agricultural Marketing Service, USDA

were not generally commercially acceptable due to nep imperfections. These findings, which showed that cotton fibers differing extremely in fineness can be utilized successfully when blended properly, revealed that the generally accepted opinion of unsatisfactory processing performance of blends containing fibers of widely different fineness may be due to the inadequacy of present blending systems and methods rather than the properties of the fibers.

2023. THE EFFECT OF SHORT FIBERS IN A COTTON ON ITS PROCESSING EFFICIENCY AND PRODUCT QUALITY. PART II: YARNS MADE BY MINIATURE SPINNING TECHNIQUES FROM DIFFERENTIALLY GINNED COTTON

Tallant, John D.; Fiori, Louis A.; and *Landstreet, Charles B.
Textile Research J. 30, 792-95. 1960

The conclusions reached by means of miniature spinning techniques with very small samples of cotton were similar to those obtained in Part I changes in short fiber content do not affect the twist required for maximum strength but do lower strength somewhat more than 1% for each 1% increase in short fiber content. These samples covered an exceptionally wide range of short fiber contents, from less than 1% to almost 20% by weight of fibers 3/8 in. and shorter. The very low short fiber content cottons were produced by careful hand ginning techniques while the remainder were obtained by differential ginning techniques.

2018. AN SRRL REPORT ON THE VARIABILITY IN ELONGATION-AT-BREAK OF COTTON YARNS (The Elongation-at-Break of Cotton Fibers Affects both Yarn Properties and Spinning Efficiency)

Louis, Gain L.; Fiori, Louis A.; and Little, Herschel W.
Textile Bull. 86, (9) 101-104. 1960

Yarn elongation-at-break data on yarns ranging in size from 15/1 to 72/1 involving 48 samples from 15 different varieties of cottons were used in this study. Standard deviations of elongation values were computed by (1) the conventional manner after reading each of the elongation measurements from the Uster Strength Tester diagram and then grouping into frequency classes, and (2) a shorter method using a template. The finding of this exploratory investigation indicates that variability in yarn strength cannot be used in place of yarn elongation variability and that variability in yarn elongation should be considered as another index of processing efficiency.

* USDA Cotton Field Station, Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture, Knoxville, Tenn.

1994. LINEAR DENSITIES OF FIBERS IN SELECTED LENGTH GROUPS OF 42 DOMESTIC AND FOREIGN COTTONS

Sands, Jack E.; Louis, Gain L.; and Tallant, John D.
Textile Research J. 30, 619-20. 1960

The linear densities of fibers in selected length groups of 42 domestic and foreign cottons are presented. It is evident that, in the preponderant number of cases, the shorter length groups have lower linear densities than the intermediate groups. However, the longest groups also have lower densities than the intermediate groups.

1976. EFFECT OF SHORT FIBERS IN COTTON ON SPINNING PERFORMANCE AND YARN PROPERTIES

Tallant, John D.; Fiori, Louis A.; Little, Herschel W.; and Leitz, Lorraine A.

Textile Inds. 124 (8) 129-33. 1960

Also, condensed version entitled "Studying Properties; Short Fibers, Real Trouble" Textile World 110, (7) 120-21. 1960

When previous work had shown that short fibers (less than 3/8") were generally detrimental to yarn properties, their effect upon spinning efficiency had not been fully investigated. It is now shown that their effects are extreme and exponential as spindle speed is increased. Further, there are strong interactions among short-fiber content, spindle speed, yarn size and twist, with the adverse effect of high short-fiber content being minimized by increases in yarn size and twist, and by decreases in spindle speed. This indicates the desirability of giving consideration to the short-fiber content of a cotton when allocating it to cotton blends for different types and sizes of yarns. As an aid to the evaluation of the relative spinning performance of cottons containing different percentages of short fibers, a somewhat shortened test procedure was used. By efficient recording and handling of the data it appears that about 720 spindle hours are sufficient to determine the relative spinning efficiency within $\pm 30\%$ at the 95% confidence level.

1955. DIFFERENTIAL GINNING: EFFECTS ON COTTON FIBERS AND YARN PROPERTIES

*Griffin, A. Clyde, Jr.; *McCaskill, Oliver L.; Tallant, J. D.; and Fiori, Louis A.

Cotton Gin & Oil Mill Press 61 (11): 19-20. 1960

Differential ginning is described and the effects of five-stage differential ginning on fiber properties from the same lot of

*Agricultural Engineering Research Division-ARS-USDA, Stoneville, Miss.

seed cotton are presented. It is shown that as ginning progresses, lint with increasingly higher Micronaire reading is produced. In fact, from a single lot of seed cotton, lint ranging from about 4.2 to 6.0 Micronaire value was produced. This range encompasses nearly the entire range of the cotton crop. As ginning progressed lint with increasingly greater short fiber content was produced. It was shown also that the yarn strength was degraded with these increases in short fiber content.

1952. A COMPARISON OF SOME PHYSICAL PROPERTIES OF 80 x 80 PRINT CLOTH PRODUCED FROM THREE COTTONS DIFFERING PRIMARILY IN FLAT BUNDLE STRENGTH

Sands, Jack E.; Fiori, Louis A.; and Brown, John J.
Textile Research J. 30, 389-92. 1960

Three cottons, representative of the main strength groups (high, medium and low) and having other pertinent fiber properties not substantially different, were processed into a standard 80 x 80 print cloth construction. The strongest-fibered cotton produced the strongest fabrics in the warp direction in the gray, bleached, and bleached and dyed states; however, in the filling direction this relationship did not hold for the bleached and bleached and dyed states. Elongation at break of fabrics (raveled strip) was apparently influenced more by mechanical treatment during chemical processing than by fiber properties. While tearing resistance of the fabrics appeared to be correlated with cotton fiber strength at zero gauge, there appeared to be no relationship between cotton fiber strength and fabric abrasion resistance except in the filling direction in the gray state.

1938. PHYSICAL PROPERTIES OF CHEMICALLY MODIFIED COTTONS. PART V: EFFECTS OF AMINIZATION

McDonald, Allan W.; Humphreys, Geraldine C.; and Grant, James N.
Textile Research J. 30, 312-17. 1960

Yarns from six cottons selected for their widely different fiber characteristics were partially aminized to a degree of substitution averaging about 0.043. Yarns were allowed to contract in length during the chemical reaction but were placed under a small load during the washing and souring processes. Moisture regain and linear density were increased by the treatment. Modified cellulose density and fiber length were decreased. The changes in tenacity and modulus showed inconsistencies among samples of different cottons, with trends similar to those found in mercerization. Decreases in tenacity were found for the fiber bundles but increases for the yarns. The single fibers showed no appreciable changes in tenacity. Scant moduli of fibers and yarns were intermediate between those of slack and normal length mercerization.

1814. EFFECTS OF GIN DRYING AND CLEANING PRACTICES ON PROPERTIES OF BLEACHED AND RESIN TREATED FABRICS

Grant, James N.; Andrews, Frederick R.; and Tsoi, Ruby H.
Textile Research J. 29, 751-57. 1959

Fabrics made from lint cotton subjected to twelve combinations of ginning practices--seed cotton cleaning, lint cleaning, and drying levels--were tested as gray, bleached, and resin treated fabrics. The seed cottons dried to the lowest moisture level before ginning produced the weakest gray fabrics. Bleaching caused no accentuation of their differences in breaking and tearing strengths which could be associated with the ginning practice since strengths of all twelve fabrics were reduced about the same amounts. Resin treatment and laundering decreased the differences in strengths among fabrics. Density of cellulose was slightly higher for the three lots dried to the lowest moisture level. Moisture regains of the bleached fabrics were essentially equal. Alkali centrifuge swelling values were more closely associated with fiber fineness than with the ginning practices. Among the fabrics, differential dyeing detected differences associated with fiber fineness but not with ginning practices. Degree of polymerization was reduced by bleaching but showed no consistent relation to seed cotton treatment. Inconsistencies between samples within groups do not permit conclusions to be reached as to effects of seed cotton cleaning or lint cleaning.

1813. THE EFFECT OF THE SHORT FIBERS IN A COTTON ON ITS PROCESSING EFFICIENCY AND PRODUCT QUALITY. PART I. AFFECTING THE SHORT FIBER CONTENT BY THE ADDITION OF CUT COTTON FIBERS

Tallant, John D.; Fiori, Louis A.; and Legendre, Dorothy C.
Textile Research J. 29, 687-695. 1959

Condensed versions published as follows: "The Effect of Short Fibers on Spinning Performance," Textile Bull. 85, (6) 36. 1959; and "Short Fibers are Harmful to Yarn and Fabric," Textile World 109, (8) 52-53. 1959

The effect of the short fiber content of a cotton on processing efficiency and on yarn and fabric properties, long a speculative and controversial subject, is investigated to a limited extent by the technique of cutting sliver into 1/4- and 1/2-inch segments and adding the results short fibers to the parent cotton. The results indicate that increases in short fibers are detrimental to virtually all yarn and fabric properties and require increases roving twist for efficient drafting during spinning. A 1% increase in fibers shorter than 3/8 in. causes a strength loss in yarns of somewhat more than 1%. The quantities of cotton processed were insufficient to draw conclusions on neps, waste, or processing efficiency. The effect of short fibers on these properties will be considered in subsequent papers.

1805. BLENDING COTTONS DIFFERING WIDELY IN MATURITY. PART I: EFFECT ON PROPERTIES OF SINGLE YARNS

Fiori, Louis A.; Louis, Gain L.; and Sands, Jack E.

Textile Research J. 29, 706-16. 1959

Condensations: "Coarse and Fine Cottons Can Be Blended Successfully," Textile World 109, (8), 53-54. 1959; and

"The Effects of Blending Cottons of Different Fiber Properties," Textile Bull. 85, (6) 37, 40. 1959

The blending of extremely fine and coarse cottons was investigated as a possible way of economically using these difficult-to-market cottons. Two cottons differing appreciably in fiber fineness (approximately 3.0 and 6.0 g./in.) but having other pertinent fiber properties about equal were blended to produce a mixture averaging about 4.0 g./in. in fineness. For comparative purposes a control cotton also averaging about 4.0 g./in. in fineness was used. The blended and control cottons were spun into coarse and medium yarns of varying twists and into yarn numbers suitable for weaving Type 128 sheeting (64 x 64). The spinning efficiency of the two cottons were evaluated, on a pilot plant basis, in terms of ends down per thousand spindle hours. Waste, nep counts, yarn properties (skein and single strand strength, break elongation, uniformity and grade), and end breakage rate in spinning were similar for the blended and control cottons. Microscopical examination of yarn cross sections did not reveal any migratory tendencies of either the fine or coarse fibers. For the same yarn number the blended and control cottons produces yarns of similar diameters and softness values.

1722. FIBER STRUCTURE AND MECHANICAL PROPERTIES OF UNTREATED AND MODIFIED COTTONS

Orr, Rollin S.; DeLuca, Lloyd B.; Burgis, A. W.; and

Grant, James N.

Textile Research J. 29: 144-50. 1959

A brief review of investigations relating fiber structure to mechanical properties of cotton is given. The relationship of fibril alignment, as measured by the x-ray technique, to the strength and elongation properties of cottons covering a wide range in physical properties is discussed. Alteration of mechanical properties of cotton brought about by degradation in hydrochloric acid, mercerization, decrystallization in ethylamine, resin treatment, and acetylation are related to changes in the fiber structure. The effects of stresses imposed during some treatments are discussed.

1720. EFFECTS OF HEAT-DRYING ON THE PHYSICAL AND CHEMICAL PROPERTIES OF COTTONS

Nelson, Mary L.; Andrews, Frederick R.; and Grant, James N.
Textile Research J. 29 (3): 260-69. 1959

The poor spinnability of some lots of gin-dried cotton has been attributed to overheating of the seed cotton. To determine what changes in the lint might be responsible, two series of gin-dried cottons and one series that was flash-heated in the laboratory were studied. Appropriate physical and chemical properties of the lint were measured, such as fiber length distribution, single-fiber and fiber-bundle strength and elongation, moisture regain, nepping potential, fiber friction, microscopical swelling, alkali swelling, wettability, fluorescence, copper number carboxyl content, pH, infrared spectra, and wax properties. Limited spinning and weaving tests allowed yarn and fabric properties to be measured. Nearly all tests showed no evidence of radical permanent changes in lint properties. The one significant finding was an altered fiber-length distribution in some heated lots such that the proportion of shorter fibers was increased while the percentage of long fibers was slightly decreased. This change appeared to be correlated with poorer yarn appearance and uniformity, a slight reduction in yarn and fabric strength, and poorer resistance to flex-abrasion. A blend of unheated lint was enough short (cut) fibers to give a fiber-length distribution approximately the same as that of a gin-overheated lot produced yarns and fabric with properties in close agreement with the overheated lot whose fiber-length distribution was approximated by the blending. Laboratory tests showed that fiber strength was lower when tested immediately after heating--that is, when the moisture regain was temporarily greatly reduced. From this finding it is deduced that the change in length distribution is the result of excessive fiber breakage when lint is subjected to mechanical agitation at too low a moisture content.

1727. MECHANICAL PROPERTIES OF CHEMICALLY MODIFIED COTTONS

Conrad, Carl M.
J. Textile Inst. 50: T133-60. 1959

The mechanical properties of certain chemically modified cotton textiles studied in considerable detail mostly at the Southern Utilization Research and Development Division are summarized. Properties studied include breaking strength, yarn knot strength, tearing strength (Elmendorf), ultimate elongation, average tensile and flexural stiffness (modulus), toughness index (work of rupture), frictional behavior, creep, elastic recovery, resilience and abrasion-resistance (flat and flex). Chemical modifications have included many types, but only those which increase the weight of the cellulose molecule through substitution of the hydroxyl groups are included in the present report. Among these are substitution with acetyl, cyanoethyl, carboxymethyl,

carboxyethyl (beta-propiolactone) and benzyl groups. The changes in various mechanical properties are related to the type of product (fiber, yarn or fabric), degree of substitution, conditions imposed during treatment and construction of the textile. The "dilution" effect, due to group weight increase of the cellulose molecules, on such properties as strength, stiffness and work of rupture is considered. Some interpretations of the results are made in terms of fine structure.

1651. EXCESSIVE DRYING AND FIBER DAMAGE

Grant, James N.; and *Merkel, Charles M.
Textile Bull., 84 (11): 48-51. 1958

In several cottons excessively dried at the gins and in laboratory driers, sufficient changes in fiber properties were found to affect their processing qualities. The permanent changes in mean length and in quantity of short fibers seem to be responsible for the major effects on product qualities. These fiber length changes are attributed to breakage resulting from mechanical working of fibers temporarily weakened because of low moisture content. Textile products made from overdried cottons which had been mechanically worked by gins or lint cleaners had lower strength and abrasion resistance and poorer uniformity as yarns and fabrics than those processed from unheated cotton. Only slight changes in chemical properties could be detected in excessively dried cotton and none in moderately dried lint.

1652. EXCESSIVE DRYING AT THE GIN DAMAGES FIBER

Andrews, Frederick, R.; and **Griffin, A. Clyde, Jr.
Cotton Gin & Oil Mill Press 59 (20) 12, 15. 1958

In cotton excessively dried at the gin, sufficient changes in fiber properties were found to account for alterations in yarn properties. The permanent reduction in length and the increase in quantity of short fibers seem to produce the major effects on product qualities. These fiber-length changes are attributed to the mechanical working of fibers temporarily weakened because of low moisture content. This weakened condition can persist in some cottons until the lint has passed through several processing stages in the textile mill; that is, until it has returned to the normal moisture equilibrium. Only slight changes in chemical properties could be detected in cotton dried excessively and none in those given moderate drying.

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1589. SOME RELATIONSHIPS BETWEEN SUPERMOLECULAR STRUCTURE AND MECHANICAL BEHAVIOR OF NATIVE AND CHEMICALLY MODIFIED COTTON CELLULOSE

Tripp, V. W.; Orr, R. S.; Ziifle, H. M.; and Conrad, C. M.
Textile Research J. 28: 404-17. 1958

Cotton fibers are constructed principally of macromolecules of cellulose. These are disposed in the fiber in such a way as to display a number of aspects, which collectively may be referred to as the "supermolecular structure." It includes such features as molecular chain length, polymolecularity, natural cross-linkage, crystallinity, crystal modification, crystallite size, orientation, accessibility, and chemical modification. Superimposed on these structural aspects is the gross morphology of the fiber itself. Many of these aspects have an influence in one way or another upon the response which the fiber makes when subjected to a variety of mechanical forces, which collectively may be referred to as "mechanical behavior." Among the responses considered are: strength, elongation, stiffness, toughness, elasticity, and resilience. Selected examples are presented, showing how the mechanical behavior is conditioned in various ways by the supermolecular structure.

1437. EVALUATION OF THE YARN PROPERTIES OF A HIGH-STRENGTH INTERSPECIES COTTON

Brown, John J.; Howell, Nathaniel A.; Fiori, Louis A.; Sands, Jack E.; and Little, Herschel W.
Textile Research J. 27: 332-39. 1957

The reported results compare yarn properties of a high-strength (11.5 Pressley Index) Interspecies cotton with those of five other cottons having a comparatively wide range of fiber properties. The cottons were processed alike on conventional equipment into 18/1, 36/1 and 72/1 carded yarns using a range of twist multipliers from 2.75 to 5.75. The yarns were tested for uniformity, appearance and strength; yarns made from the interspecies cotton were as strong as those made from the much longer and finer Karnak cotton, and stronger than those made from the other cottons. The Interspecies and Karnak yarns were about equal in uniformity, both being more uniform than the other control yarns. A limited statistical analysis of yarn breaking strength data indicates that fiber strength is more important to yarn strength than either fiber fineness or length.

1432. MOISTURE REGAIN OF NATIVE COTTON CONTAINING ANIONIC WETTING AGENTS
Koltun, S. P.; Nelson, M. L.; and Grant, J. N.
Cotton Gin and Oil Mill Press 58 (9): 26-27. 1957

Harvesting of cotton by spindle pickers is increasing in this country, and in many instances wetting agents are being used to reduce the amount of water required, and to keep the spindles clean. To determine whether or not this practice causes the cotton to absorb and hold more moisture during subsequent handling, experiments were conducted using several of the more commonly used commercial wetting agents. Results of the tests indicate there is no appreciable effect on moisture regain.

1343. COTTON QUALITY AND FIBER PROPERTIES. PART VI: COMPARISON OF A MATCHED PAIR OF RAIN-GROWN AND IRRIGATED COTTONS
Wakeham, Helmut. Contractor: Textile Research Institute, Princeton, N. J.
Textile Research J. 26: 925-36. 1956

As examples of rain-grown and irrigated cotton, seven bales each of Mississippi rain-grown Deltapine 15, and California irrigated Acala 4-42 from the 1951 crop were processed into yarns and fabrics of standard constructions. Conventional fiber tests and tests for single-fiber mechanical properties indicated the cottons were alike in all properties except the energy required to uncrimp the fibers, which was consistently higher for the irrigated cotton. Conventional chemical tests also revealed the irrigated cotton to have a higher wax content, yield a larger ash, and have a lower degree of polymerization. Definite processing superiority and slightly better product quality were observed for the rain-grown cotton in the processing comparison. From a practical point of view, however, no fundamental, deep-seated difference could be observed between the samples in this test.

1349. EFFECT OF COTTON FIBER BUNDLE BREAK ELONGATION AND OTHER FIBER PROPERTIES ON THE PROPERTIES OF A COARSE AND A MEDIUM SINGLES YARN
Fiori, L. A.; Sands, J. E.; Little H. W.; and Grant, J. N.
Textile Research J. 26: 553-64. 1956

Forty-three cottons were used to evaluate the relation of fiber bundle break elongation to yarn break elongation. These cottons were processed into a series of coarse and medium yarns of varying twists. Fiber break elongation, length fineness, strength, length variability, and maturity, were correlated with yarn break elongation at twists for maximum skein strength, maximum single strand strength, and at two constant twists (4.00 T.M. and 5.00 T.M.). The yarns varied considerably in elongation at break and strength. Yarn strength and break elongation were found to be directly related for the commercially-grown short and medium staple cottons,

but the long staple and the experimental, strong-fibered cottons produced yarns whose strength was disproportionate to their fiber break elongation. Fiber break elongation ranked first and strength ranked second in importance as contributors to yarn elongation for a 30/1 yarn at twists for maximum strength based on multiple correlation analyses. The modulus (secant) of cotton fibers and yarns were found to be highly correlated when the cottons were spun with twists which yielded maximum strength. This study also demonstrated that spinning conditions, particularly spinning tension, appreciably affect yarn elongation.

1272. COTTON FIBER BUNDLE ELONGATION AND TENACITY AS RELATED TO SOME FIBER AND YARN PROPERTIES

Hertel, K. L.; and Craven, C. J. Contractor: University of Tennessee, Knoxville, Tenn.
Textile Research J. 26: 479-84. 1956

Correlations of fiber bundle elongation and tenacity with processing and yarn properties for a number of different cottons were made in these studies. Samples of 680 cottons, grown in different environments during the crop years 1951, 1953, and 1954 were studied, and results tabulated and analyzed. The only yarn property found to be definitely correlated with fiber bundle elongation was yarn elongations. Fiber bundle elongation was also correlated with x-ray angle. Skein strength was highly correlated with tenacity measures at 1/8-inch gauge length. Stelometer values of tenacity and elongation were very highly correlated with Instron values on the same cottons.

1275. THE EFFECT OF COTTON FIBER STRENGTH ON THE PROPERTIES OF 2-PLY CARDED YARNS

Flori, L. A.; Brown, J. J.; and Sands, J. E.
Textile Research J. 26: 296-302. 1956

Two cottons (Hopi Acala 50, an irrigated variety, and Variety A) and the single yarns used in a previous study, plus yarns spun from an additional cotton, identified as Variety B, form the basis for the 2-ply constructions covered by this report. The single yarns were spun (Z-twist) using twist multipliers ranging from 2.75 to 5.75 in increments of 1.00. Each single yarn twist construction was 2-ply twisted (S-twist) with the same range of twist multipliers. In addition, a "balanced" ply twist construction was made wherein the ply twist multiplier was found to be approximately 0.7 times the single yarn twist multiplier. Single yarn number was held as constant as possible by varying the spinning draft to compensate for the contraction due to twist. It was found that for cottons of comparable fiber length and weight fineness the stronger fibered cotton produced the stronger 2-ply yarns. Also, differences in fiber strength do not affect twist-strength trends or percentage gain in strength of 2-ply over single yarns. The results of this study also indicate that fiber elongation is directly related to 2-ply yarn elongation.

1274. COTTON QUALITY AND FIBER PROPERTIES. PART IV: THE RELATION BETWEEN SINGLE FIBER PROPERTIES AND THE BEHAVIOR OF BUNDLES, SLIVERS, AND YARNS

Virgin, W. P.; and Wakeham, Helmut. Contractor: Textile Research Institute, Princeton, N. J.

Textile Research J. 26: 177-91. 1956

The purpose was to evaluate the use of single-fiber testing methods for the determination of cotton fiber properties and for the prediction of yarn quality. Samples of unprocessed cotton, finisher drawing sliver, and 36s carded yarn were obtained for 21 domestic cotton varieties representing extremes in length, fineness, and strength. Single fibers from all three processing stations were tested for their fineness and mechanical properties. The results were compared with the mechanical properties to the fiber bundles, slivers, and yarns. Correlation studies of the results show that all of the mechanical properties measured on fibers are related to fiber fineness and, among the varieties, to fiber length. Bundle strengths and elongations at clamp spacings greater than 1.5 mm. relate well to fiber breaking strengths and elongations. Sliver force-extension slope is dependent on fiber fineness and fiber elastic modulus. Yarn strength depends strongly on fiber length, fineness, and elastic modulus, and only weakly on fiber strength; yarn elongation depends greatly on fiber elongation and elastic modulus. These observations suggest that yarn strength and elongation are related to the single fiber properties and can be predicted from them fully as well as from bulk measurements of fineness and bundle strength data. They also indicate that elastic modulus is an important parameter for predicting fiber assembly behavior.

1201. RELATION OF SINGLE FIBER TO FLAT BUNDLE STRENGTH AND ELONGATION OF COTTON

Orr, R. S.; Weiss, L. C.; and Grant, J. N.

Textile Research J. 25: 939-46. 1955

Seven cotton samples and one rayon sample were tested at various gauge lengths, using the Stelometer. A method of estimating the slip length of fibers in a flat bundle test is derived and applied to these data in order to obtain a "corrected" gauge length for use in calculating strain at break. Also, a method similar to that processed by Platt et. al., of calculating the maximum possible bundle tenacity from breaking load and elongation at break of single cotton fibers is applied to previous single fiber tensile data. The resulting derived values of bundle tenacity and percent elongation are compared with measurements made on fiber bundles at equivalent gauge lengths. The flat bundle values of tenacity and elongation, measured with the Stelometer, show a good correlation with the values measured on single fibers.

36.

1148. EVALUATION OF YARN PROPERTIES AND PROCESSING PERFORMANCE OF PIMA S-1 COTTON

Brown, J. J.; Howell, N. A.; Fiori, L. A.; and Sands, J. E.
Textile Research J. 25: 404-14. 1955

Results are reported of a pilot-plant evaluation of Pima S-1 cotton using an Egyptian variety, Karnak, and an American-Egyptian variety, Pima 32, as controls. The three cottons were processed alike on conventional equipment into a range of relatively fine single- and 2-ply yarns. It was found that, within the limits of this study, the general processing performance of the Pima S-1 was equal to that of the Karnak and Pima 32 cottons. Regardless of the organizational variables used in the evaluation, the Pima S-1 cotton produced yarns of better appearance and uniformity than did the other two cottons.

1131. MEASUREMENT OF THE DRAG OF COTTON FIBERS

Mereness, H. A. Contractor: Institute of Textile Technology, Charlottesville, Va.
Textile Research J. 25: 363-72. 1955

Since drag, or frictional resistance to drafting of the fibers, may play an important part in the performance of cotton in the mills, studies were undertaken to evaluate three or more methods of measuring this quality. The drag was determined in card-sliver form, using the card-sliver stress-envelope method, and as a sliver made by hand-carding using the hand-sliver method. In general, for the 12 cottons studied, there was a significant correlation between fiber drag data obtained using both methods and skein-strength data obtained from yarns made from these cottons. There were, however, a few notable exceptions. Fiber drag data were found to correlate poorly with interfiber friction data obtained using the Hood Tester, a dynamic method. The procedures used for evaluating the various cotton fiber draw methods are described in detail.

1149. HOT VAT DYEING AFFECTS COTTON

Sands, J. E.; Fiori, L. A.; and Brown, J. J.
Textile Ind. 119 (4): 116-20. 1955

It is shown that the raw stock vat dyeing process reduced fiber length slightly. In general, vat dyed yarns are stronger than undyed yarns with the highest strength resulting from yarns dyed after spinning. Lower twists are required for maximum strength for vat dyed than for undyed yarns, with the yarns made from the dyed stock reacting less sensitively to low twists and more sensitively to high twists than those made from undyed stock. Vat dyed raw stock processes into yarns of lower grade than does undyed stock, with the high strength variety used in these studies producing yarns of better grade than the other two varieties in both the dyed or undyed state.

1065. EFFECT OF FIBER PROPERTIES ON PRODUCTS QUALITY AND PROCESSING EFFICIENCY

Cheatham, R. J.; and Fiori, L. A.
Proc. Am. Cotton Congr. 1954, 35-46.

The Fibrograph for determining fiber length; the Pressley for measuring fiber strength; the Micronaire and Arealometer for the evaluation of fiber fineness, and the Causticaire method for determining fiber maturity, make it possible to obtain rapidly much more information than formerly on these fiber properties of different cottons and to correlate them with the properties of yarns. Both general relations and specific relations between fiber properties and yarn quality and processing efficiency are discussed.

1069. COTTON QUALITY AND FIBER PROPERTIES. PART I. EFFECT OF MECHANICAL BLENDING ON COTTON FIBER PROPERTIES

Wakeham, H.; Virgin, W. P.; and Spicer, N. Contractor:
Textile Research Institute, Princeton, New Jersey
Textile Research J. 24: 802-9. 1954

A serious problem in single-fiber testing is the preparation of a homogeneous sample from which fibers may be selected randomly. Mechanical blends of the type developed for cotton by the USDA greatly improved the homogeneity of a bulk fiber sample. This blender has been evaluated for the preparation of cotton fiber samples before single-fiber testing. Relatively small changes in mechanical behavior of the cotton fibers were observed as a result of blending. With the conventional three passes through the blender breaking load decreased (less than 10%) with corresponding changes in breaking stress and energy to break. Fiber crimp was reduced and fiber length slightly increased by the fiber array method. Whether these changes in fiber properties can be avoided by proper fiber manipulation has not yet been investigated.

1081. A LITERATURE SURVEY ON FIBER FRICTION

Langston, J. H.; and Rainey, W. T., Jr. Contractor: School of Textiles, Clemson Agricultural College, Clemson, S. C.
Textile Research J. 24: 644-53. 1954

Data contained in 137 references pertinent to the subject of increasing the friction of cotton fibers, bearing on the subject either directly or by analogy, have been summarized. Most of the material was located through a search of the following sources, either in their entirety or from 1905 to August 1953: Chemical Abstracts, Industrial Arts Index, Journal of Textile Institute (Abstracts), Textile Research Journal (Abstracts), and Textile Technology Digest. Main categories are (1) Measurement of frictional properties; (2) Frictional properties of cellulosic

fibers; (3) Modification of fiber friction. Under this third classification are discussed colloidal silica; other silicon compounds; abrasives, resins; and metallic salts.

992. EFFECT OF COTTON FIBER STRENGTH ON SINGLE-YARN PROPERTIES AND ON PROCESSING BEHAVIOR

Fiori, L. A.; Brown, J. J.; and Sands, J. E.
Textile Research J. 24: 503-7. 1954

Hopi Acala 50, with fiber strength of 96,000 psi and a variety of medium strength, 80,000 psi, having other important fiber properties approximately equal, were processed alike on conventional equipment into 12/1, 22/1, 36/1, and 50/1 yarn numbers. Twist multipliers ranged from 2.75 to 6.75, in increments of one. Skein and single-strand strength data were plotted on semilogarithmic paper to show proportional rates of change in yarn strength for a given yarn number. The strength of the fiber had little or no effect on processing efficiency through spinning; as expected, fiber of high strength produces stronger yarns than fibers of low strength for any given yarn number of twist; the amount of twist required to obtain maximum strength in single cotton yarns was not affected by fiber strength; nor was significantly the uniformity of products (slivers, rovings, single yarns), nor the yarn elongation.

980. CORRELATION OF YARN STRENGTH WITH FIBER STRENGTH MEASURED AT DIFFERENT GAUGE LENGTHS

Brown, H. M. Contractor: Clemson Agricultural College, Clemson, S. C.
Textile Research J. 24: 251-60. 1954

An improved technique for flat-bundle tests of cotton fiber strength has been developed. It has been established that spacing the jaws of the tester 2 to 4 millimeters apart--instead of touching, as generally practiced--gives a more correct ranking of cotton in terms of the yarns to be spun from them. This finding indicates that some cottons now being rejected as weak on the basis of conventional flat-bundle strength tests would actually spin into satisfactory yarns. This subject was studied because many investigators question the use of the conventional so-called zero gauge length used in the Pressley Tester. Data are reported on 105 cottons. Fiber strengths were measured with the Clemson Flat-Bundle Tester at 0, 2, 4, 6, and 8 mm. gauge length and were correlated with the strength of yarns spun from the same cottons.

983. MILL LABORATORIES SHOW CLOSE AGREEMENT IN COTTON-FIBER TESTING
Hopper, T. H.
Textile World 104 (2): 131, 210, 212. 1954

Mills obtain almost identical results in laboratory tests of physical properties of cotton fibers. Tests made by the same laboratory with the same operators agree more closely than tests made by different laboratories. Fiber length was tested with the Fibrograph, strength with the Pressley Tester, and fineness with the Micronaire. Smaller differences would probably have been found if all laboratories had followed specific instructions for each test, maintained standard conditions in the testing rooms, and tested standard cottons of known properties.

856. VISCOMETRIC STUDIES OF CELLULOSE IN COTTON IN RELATION TO MECHANICAL PROCESSING
Conrad, C. M.; and Rusca, R. A.
Textile Research J. 23: 168-74. 1953

To determine whether or not the mechanical processing of cotton fibers into yarn causes any chemical degradation to the cellulose, 4 sets of samples were studied. One set had been powdered in a Wiley mill; another, processed several times through the SRRL Cotton Opener; a third, mechanically processed conventionally in the Southern Laboratory's textile mill; the fourth consisted of portions of samples used by investigators outside the Laboratory, Kriebel and Whitwell (see Textile Research J. 19, p. 556, 1949), supplied by them for these experiments. Viscosity measurements determined by the SRRL simplified techniques failed to show any chemical damage to the cellulose which could be associated with ordinary textile processing.

800. PHYSICAL PROPERTIES OF CHEMICALLY MODIFIED COTTONS
Grant, J. N.
The Cotton Research Clinic 1952: 55-57

The effect of chemical modification on the physical properties of fibers and yarns was studied through tests on 6 cottons from commercial production, representing a broad range in physical characteristics. Samples of SXP, Acala 1517, Stoneville 2B, Coker 100 Wilt, Deltapine, and Rowden 41B, were processed into yarns of 16/2 construction, and 60-yard skeins were acetylated, mercerized, carboxymethylated, decrystallized, and aminized. From measurements of length, breaking load, weight per unit length, and elongation-at-break of yarns and individual fibers taken from the yarns, the tenacity and stress-strain ratio-at-break were calculated. Fiber tenacity by the flat-bundle method also was determined.

782. FIBER STRENGTH AND YARN STRENGTH (TEST INTERPRETATIONS IMPROVED BY KNOWLEDGE OF FIBER DIFFERENCES)

Grant, J. N.

Textile Ind. 116 (7): 96-97. 1952

Prediction of yarn strength from fiber strength depends partly on the testing methods. Selecting the longer fibers from a sample can bias the results of the test, since the strength of long fibers was found to be greater than that of the short fibers in the same sample. It was learned that the average elongation-at-break of fibers of different varieties and the effect of twist on the strength of yarns produced from different cottons varied. Such information permits a better interpretation of results obtained in present tests and provides a basis for the development and use of improved testing methods.

783. EFFECTS OF MECHANICAL PROCESSING OF COTTON ON THE PHYSICAL PROPERTIES OF FIBERS

Grant, J. N.; Morlier, O. W.; and Scott, J. M.

Textile Research J. 22: 682-87. 1952

Fibers from ginned cotton and from 16/2s yarn from cottons of different physical properties were tested as a bundle and as individual fibers to determine whether changes in properties, if any, could be attributed to the mechanical processing. Data on tenacity, length array distribution, and crystal alignment revealed no consistent differences between the cottons before and after processing. The maturity of carded cottons was slightly lower. Weight fineness and breaking load of individual fibers were unchanged, but elongation-at-break was decreased. A higher modulus in tension was obtained from load-elongation curves of processed fibers, with the greatest difference found for loads below 2g.

791. COTTON FIBER PROPERTIES--A KEY TO PROCESSING DIFFICULTIES

Fiori, L. A.

Proc. Am. Cotton Congr. 1952, 38-45.

Processing problems and fiber properties are defined; and the effect of the development of rapid, new testing techniques is discussed. Some specific processing problems in relation to fiber properties and their investigation at the Southern Regional Research Laboratory and elsewhere are described. The importance of considering the effects of fiber fineness on processing is stressed. The complete utilization of fiber properties in processing should lead to better cotton products with maximum efficiency.

627. EFFECTS OF COTTON FIBER FINENESS ON THE PHYSICAL PROPERTIES OF SINGLE YARNS

Fiori, Louis A.; and Brown, John J.
Textile Research J. 21: 750-57. 1951

The effects of cotton fiber fineness on the physical properties of both coarse and fine single yarns of varying twist were investigated. The length factor was controlled by reducing the cottons to common quartile and mean lengths. The varieties studied--Seaberry Sea Island, Mesa Acala, Tanguis, and Rowden 41-B--ranged in fineness from 2.9 to 5.6 micrograms per inch and were approximately equal in other important fiber properties. A relation was found between fiber fineness and the turns per inch required in a single yarn to obtain the benefits of optimum yarn strength. Low-twist yarns decreased less rapidly from maximum strength when made from fine than when made from coarse fibers. In contrast, high-twist yarns decreased more rapidly in strength when made from fine than when made from coarse fibers. Yarns made from coarse fibers required more twist than those from fine fibers to attain maximum yarn strength. Fiber fineness did not materially affect yarn elongation. Fiber fineness was a critical factor of roving twist.

572. THE SCIENTIST LOOKS AT COTTON

Grant, James N.
Yearbook Agr. (U. S. Dept. Agr.) 1950-51: 400-4

The three qualities of cotton, staple length, character, and grade, considered in commercial classification of cottons, are discussed. Improvement in the performance of textile products has been secured by the selection of cottons by their physical properties to meet product requirements for definite service. Values for individual fiber characteristics, such as fiber strength, fineness, maturity, length uniformity, and chemical structure, are essential to an understanding of the mechanical behavior of cotton. Some of the instruments and methods which are used to obtain the specific values for these properties are described; and some comparisons are made of cotton fiber properties with those of other natural fibers and of synthetic fibers.

536. THE RELATION OF LENGTH TO OTHER PHYSICAL PROPERTIES OF COTTON FIBERS

Morlier, Ora W.; Orr, Rollin S.; and Grant, James N.
Textile Research J. 21: 6-13. 1951

The results of an investigation of the relation of tenacity of single fibers to fiber length are reported, and the instrument used in making the tests is described. Also described is a method for calculating a tenacity "index" for a cotton sample

on the basis of single-fiber tests on only 3 length groups. The average breaking load and the average tenacity of single fibers increased with increasing fiber length within a sample. Within a sample, weight fineness (taken on the center part of the fiber) reached a maximum for fibers the length of which is near the modal length. With increasing fiber length, elongation-at-break increased, ratio of elongation at break to breaking load decreased, and coefficients of variation for both breaking load and elongation decreased. The finer varieties exhibited the greater average stiffness, or ratio of tenacity to strain.

478. CALIFORNIA'S NEW COTTON SHOWS BIG IMPROVEMENT

Goldthwait, Charles F.; and Smith, Herbert O.

Textile World 100 (9): 127, 310, 312, 314, 316. 1950

The new Acala 4-42 cotton has been evaluated for fiber and processing properties. Tests substantiated, in general, claim that the new strain is superior to Acala P-18-C in spinning quality, resulting in yarns of 20-25% greater strength, and usually about half as many neps. The properties of Acala 4-42, and irrigated cotton, were found to be more nearly like Deltapine 14 than those of Acala P-18-C.

444. THE APPLICATION OF THE DIFFERENTIAL DYEING TEST FOR FIBER MATURITY TO THE PROCESSING OF COTTON

*Dean, James D., Chairman

Am. Dyestuff Repr. 39: 74-90. 1950

A unique method for distinguishing mature and immature fibers by the use of dyes has been useful in a number of different applications during the processing of cottons. Differential dyeing has been applied successfully to indicate effectiveness of blending, to check on the production of neps during processing, and to indicate the nature of fibers in the waste. Examination of dyed stock and waste samples taken at the principal stages of yarn manufacture showed that the combing operation was the only process which produced a tendency toward the selective removal of thin-walled, immature fibers as waste. The dye test and the Micronaire have both been employed for identifying cottons likely to produce neps. To establish the relationship of maturity by the dye test and fineness by the Micronaire, two groups of samples were classified by both techniques. Simple correlation of 70% and 51% were obtained with these two groups of samples. Since the production of neps is influenced by maturity more than by any other single fiber property, the dye test would appear to be more reliable for identifying cottons likely to produce neps than Micronaire fineness which has less relation to maturity.

*S. Jack Davis, Charles F. Goldthwait, Robert O. Simmons, Howard M. Waddle, and Herbert O. Smith

336. RELATION OF SPECIFIC STRENGTH OF COTTON FIBERS TO FIBER LENGTH
AND TESTING METHOD

Grant, James N.; and Morlier, Ora W.
Textile Research J. 18: 481-87. 1948

Four cottons in commercial production, covering a range of such physical properties as strength, length, and fineness, were studied in a comparison of two methods of determining fiber strength--the individual fiber test and the Pressley flat-bundle test. Because of the combing action in bundle preparation, cotton fibers broken in the flat-bundle test represent the longer fibers found in a sample of cotton. These remaining fibers are not representative of the length of the original sample; and since fiber specific strength increases with fiber length, neither are they representative of the strength of the original sample. This increase in specific strength with increase in length is evident whether fibers are broken individually or in aggregates. The relationship between the logarithm of individual fiber tensile strength and the logarithm of the specimen length used is inversely linear. The flat-bundle test represents the strength of fibers whose specimen lengths were deduced to be between $1/16$ and $3/32$ inch.

44. THE LATERAL EXPANSION OF COTTON FIBERS UNDER TENSION

Lyons, J. W.
Textile Res. 13 (11): 21-25. 1943

Measurements on approximately 1200 cotton fibers showed, in general, a lateral expansion under longitudinal tensions. Conditions of the test are described, and means of the measurements, with standard errors, are summarized in one table; in another, the data are further summarized and their significance evaluated. The lateral expansion is presumed to have an influence on the behavior of yarns and cords under certain conditions.

Processing Organization

2079. CHOOSING THE BEST DRAFT

Simpson, Jack; Callegan, Arsema T.; and Sens, Charles L.
Textile Inds., 125 (3): 93-94. 1961

This article is a reply to a "Letter to the Editor" by W. Nutter concerning the article "Choosing the Best Draft" published in the May 1960 issue of Textile Industries. The several subjects discussed show that Mr. Nutter was in general agreement with the findings in the article. It brings out that uniformity is not the sole indication of card sliver quality, but that within the range of drafts and doublings used in the investigation it was by far the dominant factor. It points out that the optimum draft distribution between the roving and spinning processes depends on the potential of the drafting systems at the individual process to maintain fiber control. However, it is shown that improving the drafting system of the roving or spinning processes would not necessarily change the optimum draft distribution between these processes, but would increase yarn uniformity and strength.

2024. CHOOSING THE BEST DRAFT. PART II--SHORT STAPLE COTTONS
(Mills can use this study to more profitably balance the factors of cost and quality in allocating drafts from picking through spinning)

Simpson, Jack; Callegan, Arsema T.; and Sens, C. L.
Textile Inds. 124, . . 11, 101, 104-105, 108-109, 115.
1960

Results are reported of an investigation to determine the optimum draft allocation between processes from picking through spinning when processing short staple cottons. It was found that short staple cottons were not as sensitive to draft allocations at prespinning processes as were the medium- and long-staple cottons. The most significant trend prior to spinning was that the most uniform rovings (.50 through 6.00) were produced from a light weight second drawing sliver (45 grs.) The findings indicate that if optimum spinning drafts are used, draft allocations prior to spinning are relatively unimportant. However, if high spinning drafts are used, the draft allocations at the prespinning processes become more important. The investigation indicated, also, that many mills are employing excessively high spinning drafts for their coarse yarns, while for their medium yarn numbers their draft could probably be increased without significantly affecting yarn uniformity and strength.

1943. CHOOSING THE BEST DRAFT. PART I. MEDIUM STAPLE COTTONS
 (Mills Can Use This Study to More Profitably Balance the
 Factors of Cost and Quality in Allocating Drafts from
 Picking through Spinning)
 Simpson, Jack; Callegan, Arsema T.; and Sens, C. L.
 Textile Inds. 124, (5) 209-10, 213, 217, 219, 223, 225,
 227. 1960

The allocation of drafts between processes from picking through spinning required to produce optimum yarn strength and uniformity was investigated for three medium staple cottons from different areas of growth. It was found that spinning draft had more effect upon yarn strength and uniformity than drafts at the other processes, although drafts at these processes had a significant effect upon these properties. The most significant trend observed for the processes prior to spinning was that a light weight second drawing sliver produces the most uniform 0.50 through 6.00 hank roving. It was noted that even though the cottons were from different growth areas, their optimum draft allocations were practically the same. In fact, their optimum spinning drafts were identical.

1816. GET THE MOST FROM YOUR ROVING TESTER
 Simpson, Jack
 Textile Ind. 123 (10): 165, 167, 169, 171, 234, 236,
 238-39. 1959

With the use of a schematic diagram it is shown that the Belger Roving Tester employs the principle that, for good processing and drafting qualities, particular hanks of roving should have certain strengths. This strength is determined by drafting slightly a specified length of roving. An equation is developed from which it is possible to determine the drafting force exerted by the Belger on any hank roving. Results of spinning trials using rovings tested by both the Belger Roving Tester and an instrument that completely breaks the roving indicate that a tester using a somewhat higher draft than that used by the Belger Tester would more accurately predict the drafting properties of rovings.

1844. WHAT SPINNING DRAFT DOES TO DOUBLE-ROVING YARNS
 Simpson, Jack; and Sens, Charles L.
 Textile Ind. 123 (9): 100-103. 1959

A study was made of the effect of spinning draft with the Whitin Casablanca double apron and the Saco-Lowell Shaw single-apron drafting systems on the properties of yarns from double rovings of short, medium- and long-staple cottons. It was found that in general the count-strength product vs. spinning-draft curves for the yarns from double rovings were

similar to those spun from the single rovings and reported in Part I. (What Spinning Draft Does to Yarn, Textile Ind. 123 (6): 108-14. 1959). At the spinning draft, which gave the highest yarn strength for each, the yarns from the double rovings were generally stronger than those from single rovings. As was true with the yarns from single rovings (Part I) the effect of spinning draft with double rovings was more critical with the medium and long than with the short staple cotton. When short staple cotton was spun, better fiber control resulted with the double than the single-apron system.

1826. AN INSTRUMENT FOR MEASURING ROVING STRENGTH

*Landstreet, C. B.; Simpson, J.; and *Hutchens, H.
Textile Bull. 85 (7): 45-48. 1959

This is a general interest article describing the principle and operating characteristics of an instrument for measuring the breaking strength of roving, along with the testing techniques employed. Since the instrument is now available commercially, the results of previous articles dealing with it are summarized to show its usefulness in cotton processing and research.

1739. WHAT SPINNING DRAFT DOES TO YARN

Simpson, Jack; and Sens, Charles L.
Textile Ind. 123 (6): 108-14. 1959

The effect of spinning draft on yarn properties was studied. The investigation covered short, medium, and long staple cottons for processing from single rovings over a wide range of drafts on both double and single apron drafting systems. It was found that in general an increase in draft resulted in a decrease in strength for coarse yarns, but an increase and then a decrease for medium and fine yarns. The importance of selecting the correct spinning draft was demonstrated when it was shown that a loss of as much as 35% in yarn strength could result by an incorrect selection of spinning draft on the high side of the optimum, while as much as 10.5% loss in yarn strength can be realized by a faulty selection on the low side of optimum draft.

* Cotton Technologist, Spinning Laboratory, Crops Research Division, ARS, USDA, Knoxville, Tennessee.

1661. PROGRESS REPORTS ON USE AND APPLICATION OF THE NEPOTOMETER:
SOME FACTORS THAT AFFECT TEST RESULTS

Markezich, Anthony R.; Tallant, John D.; and Worner, Ruby K.
Textile Research J. 28: 570-75. 1958
Condensation published: Textile World 108 (5): 92, 142.
1958

The nepotometer is in many respects a miniature card designed to simulate on laboratory samples of cotton the effects of actions encountered during the carding operation which are largely responsible for nep formation. It was developed at the North Carolina State College School of Textiles, under a contract with the U. S. Department of Agriculture, to predict the nepping potential of cottons. The use of a standard-weight test specimen does not necessarily produce a standard weight web. There may be considerable differences in this respect among different cottons. For each of eight cottons tested, the web weight and log of neps per grain increased with increased in specimen weight in the region tested between 17.5 and 27.5 grains inclusive, the increases being linear with no indication of curvilinearity. Since evaluations are based on comparison of the webs with appearance standards, the production of a constant weight web in the test is believed to be necessary. The possibility of controlling web weight by consideration of some readily determined property such as Micronaire reading or Fibrograph upper half mean length, have been derived for determining the specimen weight to use for a fixed web weight--one based on Micronaire reading and the other on upper half mean length. Good correlation was found between the log of neps per grain and the photographic standards when the web weights were approximately constant. The regression curve above Grade 1 was essentially a straight line. Neppiness standards following a regular progression can be obtained from the present photographic grades by adding another grade between the present Grades 1 and 2.

1492. COMBED ROVING TWIST FORMULA

Simpson, Jack; Corley, James R.; and Schnabel, Gerald G.
Textile Research J. 27: 812-18. 1957

This study revealed that the twist required in rovings of combed cottons for good processing and drafting qualities varies directly with the hank roving, fiber fineness (Micronaire), and the variation of fiber length (both the uniformity ratio from the Fibrograph and percent coefficient of variation from the Suter Webb Sorter). The twist varies inversely with the percent noils removed and fiber length (Classer's staple length and upper half mean from the Fibrograph). Four of these variables were incorporated into a formula, and a correction method was devised for the fifth variable. A nomograph based on this

formula was constructed. It enables rapid determination of the twist required in rovings ranging from 0.25-10.0 hank, using combed cottons varying widely in fiber fineness, staple length, and percent noils removed.

1436. THE RELATION OF TWIST TO THE CONSTRUCTION AND STRENGTH OF COTTON ROVINGS AND YARNS

*Landstreet, C. B.; *Ewald, P. R.; and Simpson, J.
Textile Research J. 27: 486-92. 1957

A study was made to determine the shape of a complete twist-strength curve of a fibrous strand, especially beyond the area of maximum strength. A method was developed for predetermining the twist to insert into yarn for maximum strength. This method made use of the following variables; (1) Yarn number, (2) Percent yarn contraction, (3) Fiber fineness, and (4) Fiber length.

1495. IMPROVE DRAWING SLIVER UNIFORMITY

Corley, James R.; and **Sandila, Dost M.
Textile Ind. 121 (11): 129-35. 1957

This report deals with the effect of doubling and tension draft in the middle drafting zone, coupled with proportionment of draft between zones, on the uniformity of drawing sliver and roving, and on yarn properties. Effects of roll settings and weights were also studied to a limited extent. Information developed indicates that: (1) If slivers fed and total draft are increased, within-yard variation increases, yard-to-yard variation decreases; (2) Sliver uniformity is improved if middle drafting zone rolls are set closer together than customary; (3) For a total draft of 6.00, near zone drafts of 1.56 to 2.00 give the most uniform sliver; (4) Heavy roll weights improve sliver uniformity. Tables and bar graphs present statistical details of the studies and results.

1351. THE EFFECT OF TWIST ON THE STATIC MODULUS OF COTTON HAWSER-TWIST CORD

Tallant, J. D.; and Brown, J. J.
Textile Research J. 26: 523-24. 1956

Quantitative data is presented on the relative effects of twist upon the modulus of cotton hawser-twist cord of a single construction. The analysis was made on data obtained on a series of 54 cords of 16's/4/3 construction with ZS twist in a number of twist

* USDA, Agricultural Research Service, Field Crops Division.

** Trainee. Pakistan Institute of Cotton Research, Karachi, Pakistan.

combinations. Increasing the twist l. t.p.i. in the components of the series appeared to lower the modulus approximately 1 g./grex/t.p.i. if in either the singles or ply, and 1.5 g./grex/t.p.i. if in the cord. Although the absolute magnitude of the effect on the modulus might be expected to change with different cottons and processing organizations, its relative values are probably applicable to 16's/4/3 hawser-twisted cord.

1277. SOME HISTORICAL AND TECHNICAL ASPECTS OF SPINNING

Rusca, R. A.; and Brown, R. S.

Textile Research J. 26: 460-69. 1956

A brief history of the development of ring spinning equipment is presented, and some of the economic and technical factors limiting further improvement of modern spinning machinery are pointed out. The discussion emphasized drafting system and ring and traveler difficulties. Several new ideas and experimental machines for drafting or twisting are illustrated, and a brief discussion is given of the basic principles of each.

1276. LIMITATIONS OF THE INDIRECT UNTWIST-TWIST AND DIRECT-COUNTING METHODS FOR DETERMINING TWIST IN CARDED COTTON SINGLE YARNS.

Worner, R. K.

Textile Research J. 26: 455-59. 1956

When carded mock-grandelle type yarns were subjected to different tensions in the untwist-twist test, twist values increased as tension was increased, but none of the tensions tried produced the "machine" or "theoretical" twist. Nine yarns were tested: 15s, 30s, and 45s, each with twist multipliers of approximately 3, 4, and 5, and three different tensions, namely grex/20 grams, 156/cotton count (grams), and 3 grams. When the distribution of twist in each successive inch of a 15s, 5 T.M. yarn was observed during the test, retwisting occurred before the initial twist had been completely removed. On inserting reverse twist equal to the initial number of turns, the yarn was more taut and had a slightly different order of distribution of twist in the successive lengths than was observed in the original yarn. If the reinsertion of twist was continued only until the original tension was restored, fewer turns of reverse twist were required and an underestimate of twist was obtained. At least two different factors, opposite in effect and varying with different yarns, appear to be operating simultaneously during the test, namely: (a) torsional effects due to mechanical strains which influence the stress-strain relations and lead to underestimates, and (b) slippage of fibers, which results in overestimates. The agreement between direct and indirect methods for counting twist will depend on the extent to which each of these factors operates in the yarn being tested. Actual count of the turns of twist in

cotton single yarns is considered the most reliable and suitable method for research and arbitration, but this method has limitations for routine testing and quality control work because of the time required and tediousness of the test.

1361. SOME OBSERVATIONS OF MAXIMUM YARN STRENGTH AND ITS RELATION TO PROCESSING EFFICIENCY

Fiori, L. A.; and Sands, J. E.

Textile Quality Control Papers 3: 218-25. 1956

Maximum yarn strength is discussed in terms of a "plateau" rather than a point on the twist-strength curve with the differences between skein count-strength product values at several consecutive increments of twist shown not to be statistically significant. The characteristics of twist-strength curves are explained using actual, machine, and so-called normal twists. The relationship of yarn breaking elongation is discussed in terms of probable yarn processing requirements, based on the concepts of average stiffness and/or toughness properties. Yarn breaking elongation is shown not to be related to staple length.

1350. THE EFFECT OF TWIST ON ROVING STRENGTH

Simpson, Jack; *Landstreet, C. B.; Schnabel, Gerald; and *Hutchens, Herbert

Textile Quality Control Papers 3: 70-78. 1956

Reported are results obtained to date in a study of the effect that twist exerts on roving strength. The study is being conducted cooperatively by the Southern Utilization Research and Development Division and the Field Crops Research Branch. The roving strength testers used in the study, which were developed and constructed by Dr. K. L. Hertel of the University of Tennessee, are described. Data are presented which indicate that the pressure between fibers necessary for good drafting of roving is greater for the fine hank roving (small diameters) than for the coarse hank roving (large diameters); that the twist-strength curve for rovings made from combed cotton is lower than the curve for roving made from carded cotton, while in yarn this relationship is reversed; that the strength of the rovings increased with storage; and that an increase in humidity results in an increase in strength, especially at the higher twists.

*Field Crops Research Branch, Agricultural Research Service, U. S. Department of Agriculture.

1346. DRAFT PROPORTIONMENT FOR MEDIUM-AND LONG-STAPLE COTTONS ON LONG-DRAFT ROVING SYSTEMS

Corley, J. R.; and Simpson, Jack
Textile Ind. 120 (12): 114-19. 1956

Four variables (total draft, fiber fineness, weight sliver, and staple length) were evaluated to develop the proper proportionment of draft on three long-draft roving systems. The results of the study revealed that with long-draft systems operating under conventional procedures, the significant factors which affect draft proportionment are (a) total draft, (b) weight of sliver fed, and (c) staple length of cotton. Fiber fineness was found not to affect the distribution of zone drafts to any noticeable extent and hence was not used in developing the formulas. Formulas developed for calculating draft proportionment on each of the three long-draft roving systems used are presented as a means of improving roving and yarn uniformity.

995.1 THE NEPOTOMETER

Bogdan, J. F. Contractor: School of Textiles, North Carolina State College, Raleigh, N. C.
Textile Forum 11 (1): 10-13. 1954

A method was needed for measuring accurately the nepping potential of cotton fibers where this could not be judged by the fiber characteristics commonly tested. To meet this need, an instrument was designed and constructed which would subject small samples to repetitions of the mechanical treatments characteristic of processing. Behavior of the samples indicates their nepping tendencies. Description of the machine and its operation, pictures, and some detail drawings are given.

980.2 MEASUREMENT OF THE NEPPING POTENTIAL OF COTTON

Bogdan, J. F. Contractor: North Carolina State College, School of Textiles, Raleigh, N. C.
Textile Research J. 24: 491-94. 1954

It has been found that the more operations, or repetitions of an operation to which cotton fibers are subjected, the greater their tendency to form neps. This principle has been made the basis for construction of a machine, the Nepotometer, to measure the nepping potential of cotton. The principles of the machine's structure and its operation are described.

989. EFFECT OF SINGLE AND PLY TWISTS ON THE PROPERTIES OF A 31/2 CARDED COTTON YARN

Fiori, L. A.; Brown, J. J.; and Sands, J. E.
Textile Research J. 24: 267-72. 1954

990. EFFECT OF SINGLE AND PLY TWISTS ON THE PROPERTIES OF A 15.5/2 CARDED COTTON YARN

Fiori, L. A.; Brown, J. J.; and Sands, J. E.
Textile Research J. 24: 428-33. 1954

991. EFFECT OF SINGLE AND PLY TWISTS ON THE PROPERTIES OF 31/2 AND 15.5/2 CARDED COTTON YARNS

Fiori, L. A.; Brown, J. J.; and Sands, J. E.
Textile Research J. 24: 526-34. 1954

High twist multipliers in the ply yarns and low twist in the single yarns give 2-ply yarns with the greatest strength and elongation at the same time. Cotton manufacturers can apply this information to judge whether changes in their twist combinations would produce 2-ply yarns of better quality at lower cost. Deltapine cotton, a variety of average fiber properties, was spun into carded yarns using two yarn numbers: 31/1 and 15.5/1, both Z twists. Twist multipliers ranged from 2.9 to 6.9 in making single yarns of both yarn counts. These single yarns were used in making 2-ply yarns (31/2 and 15.5/2, both S twist) with twist multipliers ranging from 1.9 to 7.9. Results show that maximum values for strength and elongation of 2-ply yarns are not obtainable simultaneously--they must be compromised.

977. A METHOD OF PREPARING BULK COTTONS FOR NEP COUNTING

Orcutt, P. L.; and Wakeham, H.
Textile Research J. 23: 614-16. 1953

A mechanical method of preparing cotton for nep counting, applicable to bulk cottons, wastes, slivers, and rovings, has been developed which can replace time-consuming hand methods. It is based on use of the USDA-type fiber blender. With it, 6 nep counts can be made on one sample in about 30 minutes, and indications are that even fewer counts may be representative enough.

925. NEW ROVING TWIST FORMULA

Corley, J. R.; Simpson, J.; Fiori, L. A.; and Brown, J. J.
Textile Research J. 23: 750-54. 1953

A new roving twist formula has been developed, expressed by a mathematical equation. A nomograph based on the formula was constructed by means of standard construction techniques to enable rapid determination of the turns per inch of twist required in rovings ranging from 0.25 to 10 hank (size) from carded cottons varying widely in fiber fineness and length when the Micronaire fineness and classer's length are known. Insertion of the proper twist in roving should eliminate much non-uniform yarn caused by overtwisted and undertwisted roving, and result in fewer ends down during spinning and better operating efficiency in subsequent stages.

790. DRAFT PROPORTIONMENT FOR COARSE, SHORT-STAPLE COTTON WITH LONG-DRAFT ROVING SYSTEMS

Corley, J. R.; and Simpson, Jack
Textile Ind. 116 (12): 125-31. 1952

New draft guides for manufacturing roving from a representative coarse, short-staple cotton with 3 long-draft roving systems are presented. Tests are described which demonstrated the improvement of roving and yarn evenness achieved by use of the new proportions, as contrasted to results with the proportions given in the manufacturers' guides for the 3 systems.

712. AN EVALUATION OF LONG-AND SHORT-TERM VARIATIONS IN SLIVER AND ROVING

Simpson, J.; Landstreet, C. B.; and Corley, J. R.
Textile Research J. 22: 42-48. 1952

To study the effects of processing variables on product uniformity, a procedure for evaluating uniformity has been developed. Two types of variation, long- and short-term, are common in slivers, rovings, and yarns. By measuring only short-term variation it was possible to study the effects of doubling and drafting on product uniformity; to develop drafting curves by which product variability may be predicted; and to develop a formula for the comparison of the variation in unequal counts of roving and yarn.

847. NEPS AND HOW TO CONTROL THEM

Bogdan, J. F.; and Feng, Ivan Y. T. Contractor: North Carolina State College, Raleigh, N. C.
Textile World 102 (5): 91-106. 1952

Information on the causes and prevention of neps, developed in the course of a three-year study, is presented. Basically, neps occur when fibers get out of control, and roll around each other, or become collapsed. General precautions are: to keep machines in good condition, free of rust, rough spots, and nicks; select cottons with low nep-forming tendencies; and use smooth-ginned cottons. Fiber characteristics which influence nep formation are discussed, and nepping tendencies of several varieties of cotton are compared. Severe treatment during picking and cleaning increases nep formation; cotton should be worked as little as possible. It should not be carried through pipes any more than is necessary, air currents should be controlled. Speeds and settings of licker-in, cyclinders, flats, and doffers were also found to be of great importance in the prevention of neps; influences of these factors are discussed, and recommended speeds and settings for several varieties of cotton are given. All machinery should be kept in good condition. Other factors are also discussed with regard to their influence in the formation of neps.

514. WHAT HAPPENS TO COTTON IN MULTIPLE DRAWING?

Loveless, Howard. Contractor: North Carolina State College, Raleigh, N. C.
Textile World 100 (8): 110-11. 1950

Multiple drawings were found to increase neps, strength, and uniformity of cotton slivers, and to decrease appearance and uniformity. After the first few drawings, the sliver began to look lustrous and shiny. As the number of drawings increased, the sliver began to look more "combed like" and to pull apart more easily. As the number of drawings approached 30, it was almost impossible to process the sliver further.

513. A REVIEW OF LITERATURE ON NEPS

Bogdan, J. F. Contractor: North Carolina State College, Raleigh, N. C.
Textile Ind. 114 (1): 98-103, 105, 107. 1950

A list of 95 references is given to literature on neps. Various definitions of neps are quoted, and various theories as to the causes of neps are given, along with suggested methods for avoiding nep formation.

378. DRAFTING LONG, FINE-FIBER COTTONS ON SUPER-DRAFT ROVING FRAME

Corley, James R.
Textile Ind. 113 (3): 110-13, 223. 1949

Investigation of the nonuniformity of roving produced from long, fine-fiber cottons on the Super-Draft system disclosed that these fibers are more sensitive to the influences of draft allocation than are short coarse-fiber cottons. After studies using both the existing draft table and a wide range of experimental settings, a new draft guide was developed which substantially improved the evenness of yarns and roving manufactured from two cottons with staples longer than 1-inch. This new draft guide employs advantageously three critical factors in draft allocation: the ratio of the rear zone draft to the total draft of the compound drafting section; the ratio of the rear zone draft to the weight of the stock fed; and the length of the total draft of the compound drafting section.

434. DEVELOPMENTS IN NEP CONTROL

Loveless, Howard L. Contractor: North Carolina State College, Raleigh, N. C.
Textile Forum 6-(3): 11, 12, 30. 1949

Several pieces of equipment have been developed for use in the control of neps. A specially designed template facilitates the counting of neps; its construction and the method of use are described. The author tells how to use dial gauges to aid in

adjusting card setting. A conveyor for use between the doffer and coiler head permits removal, inspection, and sampling of a full width card web. Another special device makes it possible to process narrow widths of combed picker lap. A method for producing a shadowgraph of card webs makes it possible to produce a silhouette which can be used to study the fibers in the web, which can also be retained for a permanent record.

432. NOMOGRAPH GIVES NEP COUNT PER UNIT WEIGHT

Bogdan, J. F. Contractor: North Carolina State College, Raleigh, N. C.

Textile World 99 (10): 128-29. 1949

A simple alignment chart converts neps per 100 sq. in. in card web to neps per gram, and neps per 100 yards of 22s yarn. Equations show the relationship between standard methods of expressing neppiness.

431. TEMPLATES FACILITATE COUNTING OF NEPS

Bogdan, J. F. Contractor: North Carolina State College, Raleigh, N. C.

Textile World 99 (6): 142. 1949

A new style of template has been devised which holds the card web sample and exposes well-defined areas through circular openings to permit rapid accurate counting of neps. The construction of the template, and its advantages, are described.

334. EFFECT OF DRAFT DISTRIBUTION ON STRENGTH AND APPEARANCE OF COTTON YARN

Fiori, Louis A.

Textile Ind. 112 (6): 92-7. 1948

Changes in drafts were studied with a view to assembling a system of drafting which would provide flexibility in mill operations without impairing yarn quality. Four different varieties of cotton, representing extremes in staple length, were used in identical experiments in which drafts were varied on the drawing, roving and spinning machines. The effect of these variations on skein strength and grade of a single coarse yarn (15.75s) was determined. It was found that increases in draft on the drawing and roving frames did not materially affect either strength or grade, while increases in spinning drafts resulted in lower skein strength but had little or no effect on the grade of the yarn.

212. EFFECT OF SKEIN LENGTH ON YARN NUMBER AND STRENGTH DETERMINATIONS OF COTTON YARN

Lewis, Walter S.

Textile Research J. 16: 576-80. 1946

Skeins of varying lengths were prepared from each of 13 cotton yarns, tested for yarn number and strength, and the average results obtained from each skein length for a specified yarn were compared. Data are discussed and tabulated which show that in the skein test customarily used in cotton mills to determine yarn number and strength, a much shorter length skein than the one known as standard (120 yards) is adequate, and that skeins as short as 12 yards should be suitable for most control production testing. Other pertinent data are given, including the coefficients of variation of yarn number and strength for each series of tests.

Fabric Properties

2012. INFLUENCE OF FABRIC STRUCTURE ON TEAR STRENGTH OF RESIN-TREATED COTTON FABRICS

Stavrakas, E. James; and Platt, Milton M. Contractor: Fabric Research Laboratories, Inc., Dedham, Mass.

Textile Industries, 124 (10) 141-60. 1960

Analytical determination of the causes of the loss in tear strength exhibited by the principal types of commercial cotton fabrics following resin treatment showed the following: that large losses in tearing strength result from the preparatory finishing processes, i.e., desizing, scouring, bleaching, and dyeing; that scouring was largely responsible for this loss in tearing strength; that commercially resinated fabrics exhibit both losses and improvements in tearing strength; that the fabric structural types that exhibited significant reductions in tearing strength also had large losses in yarn strength and slight changes in the number of threads rupturing per peak; but that the structural types exhibiting higher tearing strength displayed significant increase in the number of threads rupturing per peak (an indication of improved yarn mobility) and considerably less reduction in yarn tensile strength.

Theoretical and empirical analyses indicate that the tearing strength of cotton fabrics may be improved through structural changes which increase the mobility of the yarns in the plane of the fabric, by increasing yarn strength, or by a combination of these factors, and that improvements in tearing strength may be obtained through one or more of the following: use of weaves with longer floats, use of more open textured

fabrics, use of opposite twists in warp and filling yarns, and use of coarser, stronger yarns. Using these structural variations, a series of 31 experimental fabrics, including the 4 controls, were produced and resin treated to determine the extent of improvements realized in the 4 principal types of cotton fabrics (print cloth, broadcloth, twills, and sateens) which are commercially resin treated. The analyses of this series of fabrics showed the following: that preparatory treatments generally had a more deleterious effect on tearing strength than did the resin treatment; that the structural variations which gave enhanced yarn mobility or those containing stronger yarns yielded fabrics with improved tearing strength; and that structural variations which resulted in improved tearing strength did not adversely affect drape, tensile strength, abrasion resistance, and crease recovery.

1836. PROPERTIES OF FABRICS PRODUCED FROM THREE EXTRA LONG STAPLE COTTONS

Ruppenicker, George F., Jr.; and Brown, John J.
Textile Research J. 29: 567-73. 1959

Results are reported of a comparative evaluation of the properties of fabrics produced from the American-Egyptian Pima S-1, Egyptian Karnak, and a high strength Upland cotton, Hybrid Strain 330. Relationships of some fiber and yarn properties to fabric properties are shown. The reactions of fabrics woven from these cottons to chemical finishing treatments (mercerization, scouring, bleaching, and dyeing) are also discussed. In general, it was found that the Pima S-1 cotton produced fabrics which were approximately equal in breaking and tearing strength to those made from Hybrid Strain 330 cotton and which were stronger than those made from Karnak. Gray fabrics made from Pima S-1 had higher elongation, greater resistance to flex abrasion, and better draping qualities than those made from the other two cottons. The finishing treatments had varied effects on the fabrics, but in most cases those made from Pima S-1 remained equal to or better than those made from the other cottons in the properties measured. Fiber and yarn properties were closely related to fabric properties.

1728. MOISTURE REGAIN OF TIGHTLY WOVEN COTTON FABRICS

Skau, Evald, L.; and Honold, Edith
Textile Research J. 29: 96-97. 1959

Experimental data are presented from which it can be concluded that the mechanical restraints to swelling in a tightly woven cotton fabric are sufficient to result in a measurably lower moisture regain than that for the loose yarns when exposed to even moderate relative humidities. The compression of the fibers prevents them from swelling freely and thus limits the amount of water they can sorb.

1147. EFFECT OF FABRIC STRUCTURE ON FABRIC PROPERTIES

Brown, J. J.; and Rusca, R. A.

Textile Research J. 25: 472-76. 1955

Research leading to the development of specialized fabrics for an agency of the Department of Defense is described. Requirements called for the fabrics to be highly resistant to the passage of water and air, and to possess relatively high tensile and tear strength, yet to be light in weight. The effects of 7 types of fabric structure on the physical properties of the fabrics are discussed. Of the constructions tested, basket weaves offered an acceptable compromise among the properties desired, with a 2/2 basket being highly water resistant without any chemical treatment and a 3/3 basket being slightly less water resistant and slightly more tear resistant. Regardless of the weave, as the picks per inch were increased, air and water resistance increased and tear strength decreased. Bleaching, mercerizing, and dyeing significantly decreased the tightness of the fabrics; however, application of a flame-retardant and water-repellent treatment almost restored the original resistance of the fabrics to the passage of water and air.

1053. APPLICATION OF MERCURY-INTRUSION METHOD FOR DETERMINATION OF PORE-SIZE DISTRIBUTION TO MEMBRANE FILTERS

Honold, E.; and Skau, E. L.

Sci. 120: 805-6. 1954

Results indicate that the effective pore-sizes previously calculated from the mercury-intrusion measurements of the cotton textile are reasonably accurate. The pore-size distribution data obtained by this method should prove useful in theoretical and practical investigations dealing with the characteristics of these and similar types of filters--and, in fact, of a variety of porous materials.

923. INTERFIBER PORE-SIZE DISTRIBUTION OF LINT COTTON

Skau, E. L.; Honold, E.; and Boudreau, W. A.

Textile Research J. 23: 798-803. 1953

Pore-size distribution of textile materials by the mercury-intrusion method has been investigated by use of an adaptation of a commercially available high-pressure porometer. It appears possible to produce cotton wads, yarns, or fabrics whose pore-size distribution will approach specific requirements if due consideration is given to the weight-fineness and cross-sectional shape in choosing the component fibers, to the degree of fiber packing, and to the proper mixing of dissimilar cotton fibers. In order to substantiate this hypothesis and to render it more usable, additional studies are needed to obtain a better qualitative, or more nearly quantitative, interrelation of the parameters involved.

533. PORE-SIZE DISTRIBUTION IN A SELECTED SERIES OF CLOSELY WOVEN FABRICS

Honold, Edith; and Skau, Evald L.

Textile Research J. 21: 419-27. 1951

The mercury-intrusion method for the determination of pore-size distribution was applied to 18 closely woven cotton fabrics, chosen to show the effect of maturity count, pickage, and processing (scouring and Zelan finishing). The apparatus used permitted a survey of practically the whole (96%) of the available void enclosed by the sample. The pressuring curves of the mature-cotton fabrics disclosed a rather distinct separation between the filling of the surface depressions and of the interfiber regions; the curves of the immature indicated a greater overlapping and blending of all regions. A comparison of the mature- and immature-cotton fabrics showed a shift in distribution toward smaller pore sizes in the immature. A similar trend to smaller pores was observed as the closeness of cloth weave was increased; this trend was further emphasized by a comparison of the fabric data with those obtained for the corresponding yarns. Processing resulted in a loss of total void volume included in the sample. The proportion of void volume within the interfiber pore sizes was increased at the expense of the volume within the surface depressions. A correlation between air permeability and the void volume of the interfiber range indicated that the interfiber pathways were the dominant factor in determining air permeability in these tightly woven fabrics.

438. MEASUREMENT AND THEORY OF ABSORBENCY OF COTTON FABRICS

Buras, Edmund M., Jr.; Goldthwait, Charles F.; and Kraemer, Rita M.

Textile Research J. 20: 239-48. 1950

A simple and rapid absorbency-measuring test for application to cotton fabrics, using apparatus which is easy to assemble, evaluates numerically the rate of absorption and the ultimate absorption, largely independently of apparatus characteristics. The separate evaluation of these independent factors and the elimination of timing procedures set this test apart from those previously published. The method is readily adaptable to the investigation of many liquid-absorbent relationships. Applications of the test to the evaluation of absorbency of purified cotton fabrics have led to a plausible explanation of their absorption behavior as being largely due to the spaces within the fabric rather than to the absorption characteristics of the fiber itself.

402. PORE-SIZE DISTRIBUTION IN TEXTILES

Burleigh, Edward G., Jr.; Wakeham, Helmut; Honold, Edith;
and Skau, Evald L.

Textile Research J. 19: 547-55. 1949

After modification to permit measurements at lower pressure, the mercury-intrusion method for the study of the pore-size distribution of petroleum earths was applied to the study of fabrics. The results showed significant differences in the pore-size distribution curves of 10 selected fabrics. The peaks of these curves, predominantly a measure of the interfiber pore spaces, fell between pore radii of 2 and 4.5 microns, depending on such factors as fiber fineness or maturity and yarn compression. A comparison of the peak positions with data on air permeability indicated a correlation. High-pressure curves for cotton fibers suggested a collapsing of the lumen. Cotton fibers showed a volume change three times that of rayon filaments when each material was pressured to 10,000 psia.

Testing

1948. A MEASUREMENT OF COMBING EFFICIENCY

Simpson, Jack; and Ruppenicker, George F., Jr.

Textile Bull. 86 (5): 103-106. 1960

A method of measuring combing and detaching efficiencies is outlined and represents an improvement over existing methods. The combining and detaching efficiencies are based on the idea of dividing the percentage of noil fibers and sliver fibers in certain length groups by the percentage of fibers that should be in these length groups for perfect combing when weighting according to length group and expressing the resultant as a percentage. It is found that the combining and detaching efficiencies vary with the percent noils removed by the comb. The combining efficiency increases with increased noil removal, and the detaching efficiency decreases. When comparing the efficiency of combers, or combing methods care must be used in ascertaining that the percentage noils removed are the same and that any noted difference in the calculated efficiencies is not attributable to operator error in making the arrays.

1939. INTERLABORATORY STUDIES OF THE SHIRLEY ANALYSER METHOD
 Little, Herschel W.; Fiori, Louis A.; and *Mayne,
 Samuel C., Jr.
 Textile Research J. 30. 319-31. 1960 (Letter to the
 Editor)

This "Letter To The Editor" of the Textile Research Journal brings into focus a few of the problems that may be faced by participants at the General Plenary Sessions of the International Standards Organization on Textiles in England on May 19-21, 1960, in attempting to standardize the Shirley Analyser Method of estimating the amount of lint and trash present in cotton. The letter discusses an interlaboratory study of the Shirley Analyser Method conducted by the American Society For Testing Materials and another by the Swedish Institute of Textile Research made at the request of the International Federation of Cotton and Allied Textile Industries. Despite some differences in approach and analysis, results from both studies agree rather closely, especially with respect to average trash and lint contents and variability among and within these averages. The letter concludes that the wide variation in test results among laboratories would appear to limit routine use of this method in commercial transactions for arbitration purposes. However, the rather good precision found within laboratories makes the method extremely useful for comparing within the same laboratory, trash and lint contents of different cottons, the same cottons cleaned by different equipment or cottons treated or selected in other ways.

1754. THE PRACTICE OF TEXTILE MICROSCOPY
 Rollins, Mary L.
 Yearbook N. Y. Microscopical Soc., No. 6, 25-36. 1958

The microscope has been used in textile research for more than 120 years. The first quarter of the Twentieth Century saw a number of manuals and textbooks published on the subject, and the period following the Second World War has produced another group of books devoted to textile microscopy per se. The practice of textile microscopy encompasses studies of fabrics, yarns, and fibers at various stages of processing and finishing, and under various conditions of damage, deterioration, or wear. It includes fiber identification, yarn, and fabric analysis, as well as observations

*ACCO Fiber & Spinning Laboratory, Anderson, Clayton & Co.,
 Houston, Texas.

on the extent and uniformity of chemical substitution or impregnation treatments. Typical problems involving these operations are cited, and the application of the electron microscope to textiles is discussed.

1753. METHOD USED FOR DETERMINING WARP CRIMP

Kingsbery, E. C.; and Roddy, N. P.

Textile Research J. 29: 521-22. 1959

A device has been developed to measure accurately an 18-inch length of warp yarn as it is pulled from the loom beam in weaving. This device is used to facilitate the determination of crimp in warp yarn. A photograph and drawing of the device are included.

1655. IMPROVEMENT ON THE SERVO CONVERSION OF MANUAL FIBROGRAPHS

Tallant, John D.

Textile Research J. 28: p. 815 (Letter to the Editor) 1959

Simple instructions for the improvement of the servo converted manual fibrographs are given. The addition of a small condenser, resistor, and two diodes is recommended. If these modifications are made, more stable operation, greater accuracy, and higher speed are obtained.

1841. A TEX-COTTON COUNT CONVERSION SCALE

Louis, Gain L.

Textile Research J. 28, 716-17. 1958

A useful conversion scale is proposed as a convenient method of converting yarn size from cotton count to tex, or vice versa, based on the relationship that $\text{tex} = 590.54/\text{cotton count}$. The scale is applicable to both yarns and roving with sizes which are common and popular in U. S. Textile mills and is designed as a substitution for massive conversion tables when only the approximate value is needed.

1590. SPINNING TESTS

Little, H. W.; Fiori, L. A.; and Sands, J. E.

Textile Ind. 122 (3): 107-110, 121, 123, 126-127. 1958

The meaning of the term "spinning test" is described in general terms and a definition given. Spinning tests are classified as to purpose, size, and criteria evaluated. Purpose as related to size and scope of test is discussed. The importance of measuring and indicating the reliability of test result is emphasized and the more elementary techniques of accomplishing this are explained. The latter part of the report is devoted to a consideration of some of the questions that arise in the application of spinning tests such as the number of observations

required to attain a desired reliability and to the presentation of specific examples of the application of spinning tests to various types of problems.

1575. A METHOD FOR MEASURING YARN SOFTNESS AND ITS USE TO SHOW THE EFFECT OF SINGLE AND PLY TWIST ON THE SOFTNESS OF 31/2 COTTON YARNS

Skau, Evald L.; Honold, Edith; and Boudreau, William A.
Textile Research J. 28: 206-12. 1958

An apparatus is described for measuring yarn softness in terms of the percent increase in yarn width when the yarn is subject to lateral pressure between two parallel plane surfaces. Softness data obtained on a family of 31/2 cotton yarns have been presented as a contour diagram which, in connection with similar contour diagrams of other important yarn properties, shows the interrelationship of these properties over a wide range of single and ply twist combinations.

1653. HOW FEASIBLE IS A SINGLE TEST FOR FIBER STRENGTH, MATURITY, AND FINENESS?

Hopper, T. H.
Proc. 11th Ann. Cotton Merchandising Clinic, 1958: 44-52.

Reasoning from the correlations found between and among physical properties and compositional factors for certain oilseeds and vegetable oils, it is postulated that it may be feasible to develop a single test for strength, maturity, and fineness of cotton. To accomplish this, it may be necessary to develop new objective tests and test instruments. Some data are given which indicate the level of correlation between the fiber properties as obtained by use of present instruments.

1664. TRANSITION FROM SUBJECTIVE TO OBJECTIVE COTTON TESTING

Hopper, T. H.
Proc. 10th Ann. Cotton Merchandising Clinic, 1958: 48-50

The current transition from subjective to objective cotton testing is cited as being similar to changes already made in the evaluation of wheat, oilseeds, and other commodities for marketing purposes. The gain made in objective testing of cotton would be enhanced through the development of new instruments to provide for rapid testing at low cost and the establishment of rules and levels of test for their use in marketing.

1433. NOMOGRAPH FOR EXTENDING THE RANGE OF THE AREALOMETER

Tallant, John D.

Textile Research J. 27: 436-38. 1957

Occasionally there is need to evaluate cottons which are beyond the range of the Arealometer's calibration. Through analysis of the relationships between air-flow resistance and specimen size, a formula and nomograph are developed which extend the scale to cover these anomalous cottons. For extremely fine and immature cottons, a specimen mass of 75% of normal has been found practical. The test is conducted in the usual manner and the dial value is then converted to the true value by means of either the nomograph or the equation. Procedures are also outlined for use with extremely coarse cottons and for altering the mass to give a definite value for the void fraction.

1430. A COMPARISON OF EGYPTIAN AND AMERICAN METHODS FOR EVALUATING COTTON QUALITY

*Abou Sehly, A. A. H.; Tallant, John D.; and Worner, Ruby K.
Textile Research J. 27: 73-78. 1957

Comparative data on fiber properties are reported for 12 samples of Egyptian cotton, using the different techniques employed at the Giza Spinning Test Mill in Egypt and at the Southern Regional Research Laboratory. Results obtained with the Ball's Sorter, which is commonly used in Egypt for length measurements but little known in America, were found to correlate highly but at a different level with Fibrograph and Suter-Webb array data. Both laboratories use the Micronaire and the Pressley Tester. The test results were used to illustrate how the Giza Spinning Test Mill applies the length fineness ratio for separating cotton into categories. The strength of the cottons in these categories is then indicative of whether a particular cotton is anomalously strong or weak. This relationship provides a criterion for determining the suitability of a new variety for possible commercial development, as well as for selecting cottons for specific end uses.

1360. SOME NEGLECTED AND UNEXPLORED PHASES OF COTTON FIBER MEASUREMENTS

Hopper, T. H.

Proc. Ninth Ann. Cotton Merchandising Clinic 1956: 88-90

Tests for the measurement of the fiber properties of cotton could be used much more extensively and intensively. To bring this about, methods of rapid and low-cost testing are needed,

* Ministry of Agriculture, Cairo, Egypt.

as well as greater knowledge of their potential uses. Properties to be measured, and uses to which knowledge of these properties can be put for the improvement of processing quality and end uses are discussed.

1202. RELIABILITY AND USE OF THE SPINNING TEST TO EVALUATE COTTON QUALITY

Fiori, L. A.; Sands, J. E.; and Little, H. W.

Proc. Eighth Ann. Cotton Merchandising Clinic 1955: 48-50

The spinning test is defined, and types are discussed in detail. Purposes for which the spinning test is used and the measures of quality for evaluation of results are also discussed. Data obtained from a spinning test are considered from two points of view: evaluation of reliability by statistical analyses, and use for determination of the processing performance of cottons and textile machinery and methods. Under reliability, skein and single strand strength data of single and 2-ply yarns are discussed. Shown are extremes in variability based on strength observations and statistical techniques used to establish testing programs to secure reliable results. The effect of roving storage on the reproducibility of yarn strength, and of spinning draft constants on variability of yarn number is presented. Examples showing the use of the spinning test at the Southern Regional Research Laboratory are given.

1198. FABRIC EMBEDDING FOR MICROTOME SECTIONING

deGruy, Ines V.

Textile Research J. 25: 887-88. 1955

A modified embedding technique for the preparation of fabric samples for microtome sectioning has been developed. Where other methods require the use of monomeric materials which must be polymerized in an oven, this technique employs a viscous aqueous solution of polyvinyl alcohol which hardens overnight at room temperature. The aqueous solution permits embedding and sectioning of coated fabrics, which would be distorted by swelling of the coating in the usual embedding media. Materials and methods are described.

981. THE MICROSCOPE AND THE COTTON MILL

deGruy, I. V.; and Rollins, M. L.

Textile Ind. 118 (6): 114-53. 1954

Various microscopical techniques are used to investigate problems that arise in cotton textile mills. Fourteen photomicrographs show views of fibers depicting possible sources of spinning difficulties; number and maturity of fibers, their peripheral characteristics, airspaces;

uniformity of fiber blends, neps and stains, effects of water, penetration of chemical treatments, or of molecular modification. Electron microscope views detail fine structure of cotton's primary wall; of untreated and mercerized fiber.

982. DEVIATIONS IN INSTRUMENTAL EVALUATION OF THE PHYSICAL PROPERTIES OF COTTON

Hopper, T. H.; and Tallant, J. D.
Textile Research J. 24: 53-57. 1954

Increased use by mills and laboratories of the Fibrograph to measure length, of the Pressley Tester to measure strength, and the Micronaire to measure fineness of fibers, has indicated a need to maintain uniform levels of testing within a laboratory and between laboratories throughout the country. The sample-testing program was sponsored by Committee D-13 of the American Society for Testing Materials during 1951 and 1952.

928. EXPLANATION OF CORRECTION FACTORS FOR THE USTER UNIFORMITY TESTER

Oser, L. F.; and Fiori, L. A.
Textile Ind. 117 (7): 123. 1953

The operating principles of the Uster Uniformity Tester which make necessary the use of correction factors for both the Integrator and Range values are explained, and the mathematical derivation of these factors is outlined.

864. HOW TO IMPROVE WINDING OF YARN-GRADING BOARDS

Wallace, E. F.
Textile World 103 (3): 111. 1953

Modifications of the Suter Yarn Evenness Controller are described that enable the instrument to more accurately and uniformly wind yarn boards used for the evaluation of yarn grade according to ASTM yarn appearance standards.

924. SOME APPLICATIONS OF LIGHT MICROSCOPY IN THE STUDY OF TEXTILE MATERIALS

Tripp, V. W.
Am. Soc. Testing Materials, Symposium on Light Microscopy,
Spec. Publ. No. 143, 25-34. 1953

Some of the objectives of textile microscopy are set forth, and accepted methods of accomplishing them are described and illustrated. Discussed are apparatus of textile microscopy; fiber identification and analysis; fiber measurements--of diameter, thickness, or cross-sectional area--and preparation of cross sections. The use of the techniques discussed in studies of textile processing and behavior is described and illustrated.

921. A SINGLE-FIBER LOAD-ELONGATION TESTER FOR COTTON

Orr, R. S.; and Grant, J. N.

Textile Research J. 23: 505-9. 1953

A single-fiber tester of the type employing a constant rate of loading is described. Designed especially for obtaining load-elongation curves in addition to end-point data on cotton fibers, it employs coiled-spring loading and optical means of recording. Devices are incorporated that permit cyclic loading studies and static life determinations. An oven and humidification tank are provided for testing at various temperatures and under various moisture conditions.

788. USE OF A SERVO SYSTEM FOR AUTOMATIC OPERATION OF THE FIBROGRAPH

Tallant, J. D.

Textile Research J. 22: 617-19. 1952

The Fibrograph can be converted to automatic operation by using a small, low-speed motor to drive the left handwheel and by replacing the galvanometer and manual operation of the right handwheel with a servo system to maintain balance by driving this handwheel. The accessories required are rugged and are commercially available. Smoother curves are obtained by this method, and the operator is free to comb the next text sample while the curve is being drawn.

785. CHECK SAMPLE TESTING OF PHYSICAL PROPERTIES OF COTTON WITH INSTRUMENTS (A SUMMARY REPORT PREPARED FOR THE TASK GROUP ON INTERLABORATORY CHECK SAMPLE TESTING OF COTTON FIBERS)

Hopper, T. H.

Textile Research J. 22: 472-75. 1952

Increased use of instruments for the measurement of length, strength, and fineness of cotton indicates need of a uniform level of testing within a laboratory and between laboratories. To learn the uniformity with which results are obtained by use of the Fibrograph, Pressley, and Micronaire, a Task Group was appointed by Committee D-13, Subcommittee A-1-1, Cotton and Its Products, of the American Society for Testing Materials, to conduct a program of interlaboratory check sample testing, each laboratory to follow its regular test procedures. Results of the first tests indicate need for greater standardization.

710. THE IMPORTANCE OF CORRECTING RANGE VALUES ON THE USTER UNIFORMITY TESTER

Fiore, Louis A.; and Oser, Louise F.

Textile Ind. 116 (1): 149, 151, 153, 169. 1952

The range method is used far more widely with the Uster Uniformity Tester for determining product unevenness than is the integrator method, but unless correction factors are

applied it is difficult to obtain comparable results by the range method from different machines. The purpose of this article is to show the necessity for applying these factors to eliminate machine and product variables. The effects of average value settings and yarn number changes, as well as the results when range is not corrected, are shown graphically. Range readings are generally corrected by choosing the factor corresponding to the average value reading of the integrator and multiplying this by the original unevenness reading. Also described is a method whereby an estimated average line can be used in place of the integrator average value reading.

620. FIGURE EVENNESS BY MACHINE OR PLANIMETER?

Rusca, Ralph A.

Textile Ind. 115 (7): 79-81. 1951

Tests of the Uster Yarn Evenness Tester under slightly different atmospheric conditions at the Southern Regional Research Laboratory showed that the minor fluctuations in conditions did not significantly affect the measurement of long-term variations in product uniformity; but that they did affect the measurement of short-term variations. Reading percentages directly from the chart produced results comparable to those obtained by the use of a planimeter, and in one-eighth to one-tenth the time.

623. APPARATUS FOR EVALUATING WARMTH OF TEXTILE FABRICS

Tallant, John D.; and Worner, Ruby K.

Textile Research J. 21: 591-96. 1951

A semiautomatic apparatus requiring minimum operator attention has been assembled for measuring the thermal transmission of fabrics while subject to moving air at constant temperature. The difference in the amount of energy required to maintain constant temperature in a body when bare and when covered with the test specimen is measured. Conditions have been set up with an air velocity of 12 to 13 m.p.h. so that performance under fairly severe conditions of use can be approximated. The apparatus has been found to differentiate among fabrics ranging from thin, plain-weave, nylon cloth to heavy woolen blankets, and in a manner that apparently takes into account the various fabric properties.

567. TESTS TO HELP YOU KNOW TEXTILES

Worner, Ruby K.

Yearbook Agr. (U. S. Dept. Agr.) 1950-51: 457-65.

A review is given of the wide variety of tests which are used to check the many individual properties of textiles, from the raw material to the finished fabric, and to predict their serviceability in specific end uses. Such tests are generally

applied by cotton purchasing agents, manufacturers, research chemists, and a few even by consumers. The importance of making the tests under controlled conditions and standardized procedures is stressed. The qualities which are regularly tested include strength, colorfastness, launderability, air permeability, and resistance to water, mildew, fire, and abrasion. Some of the more complex characteristics important to the consumer for which test procedures have not yet been fully standardized include warmth, wear, and the properties relating to hand and appearance, such as crease resistance, pliability, drape, and luster.

564. MEASURING THE ABSORBENCY OF COTTON

Buras, Edmund M., Jr.

Yearbook Agr. (U. S. Dept. Agr.). 1950-51: 419-20

Absorbency-measuring tests which have been employed up to now are largely inadequate and arbitrary. A test method described here is more suitable in that it meets the requirements of wetting the fabric quickly from one side while it is under pressure and allowing the comparison of different fabrics in a readily understandable manner. The improved test is based on the use of automatic devices. The glass apparatus is easily assembled and calibrated. The simple, rapid test permits numerical evaluation of both rate of absorption and total or ultimate absorption, largely independently of apparatus characteristics. Application of the test to the evaluation of absorbency of purified cotton fabrics has led to a plausible explanation of their absorption behavior as being due largely to spaces within the fabric rather than to the absorption characteristics of the fiber itself.

365. TEXTILES THROUGH THE MICROSCOPE

deGruy, Ines V.

Sci. Monthly 68: 61-5. 1949

Some of the investigations conducted at the Southern Laboratory are used to illustrate the role of the microscope in textile research. Textile microscopy has been applied to studies of tire cord construction, adhesion, and impregnation; to investigations of mercerized and chemically treated cottons; and of cotton dyeing; to problems of fiber identification; and to many other phases of research on fibers and fabrics. The fiber microscopist has unlimited opportunities to assist first the chemist and ultimately the manufacturer in the development of improved materials for consumer use.

385. AN INDEX OF THE WATER-REPELLENCY OF TEXTILES FROM THE SURFACE TENSION OF AQUEOUS SOLUTIONS

Schuyten, H. A.; Weaver, J. W.; and Reid, J. David
Am. Dyestuff Reprtr. 38: 364-68. 1949

A method has been devised for indicating the relative surface tensions of solids by determining the surface tension of a standard liquid which will wet the solid under selected conditions. The liquid selected was water containing various amounts of a wetting agent, prepared in such a manner as to obtain a series of solutions with surface tension values ranging from 27 to 72 dynes/cm. By the use of solutions whose surface tensions are known, and by employing an electrical indicator, the point where fabrics become wet can be determined. The surface tension of the solution necessary to cause this wetting is taken as an index of water-repellency of the fabric. This system gives a range of at least 22 measurable units compared to 5 arbitrary units of the much-used spray test.

376. USE OF PROBABILITY PAPER FOR ESTIMATING THE MEAN AND STANDARD DEVIATION OF NORMALLY DISTRIBUTED TEXTILE TEST DATA

Tallant, John D.
Textile Research J. 19: 270-73. 1949

The use of probability paper for estimating the mean and standard deviation of normally distributed test data is illustrated through the use of textile test data for strength. The method is time-saving in handling a large number of samples. A brief discussion is given of the mathematical theory substantiating the method.

299. DETERMINATION OF THE RATE OF WATER ABSORPTION OF LIGHTWEIGHT COTTON FABRICS

Kettering, James H.
Am. Dyestuff Reprtr. 37: 73-5. 1948

A simple, rapid procedure is suggested for determining the rate of water absorbency of lightweight fabrics, and the necessary apparatus is described. The method consists essentially of determining the time required for a disc of test fabric to absorb a measured volume of water from the surface of a porous plate. It gave fairly reproducible results in the hands of different operators and compared favorably with two other widely used methods for measuring absorbencies.

205. AN APPROXIMATE FUNCTION FOR TESTING THE SIGNIFICANCE OF DIFFERENCES ACCORDING TO THE "STUDENT"-FISHER t-TEST

Lyons, W. James

Textile Research J. 16: 438-40. 1946

An approximate function for applying the t-test in a new manner is suggested. This function is intended to express results and their significance in a simple, concise manner, and to replace verbal expressions dependent on the personal interpretation of the experimenter. The method is considered suitable for use in textile research and other industrial laboratories. Equations for its derivation and application are given.

125. A TENSIOMETRIC METHOD FOR EVALUATING SURFACE WETTABILITY BY MEASUREMENT OF THE CONTACT ANGLE

Wakeham, Helmut; and Skau, Evald L.

J. Am. Chem. Soc. 67: 268-72. 1945

The basis for a simple contact angle measurement by means of an ordinary interfacial tensiometer in evaluating surface wettability is outlined and the method for measurement described. Contact angles corresponding to various tensiometer readings derived experimentally are shown to agree with values obtained from theoretical considerations. Application of the method to the measurement of contact angles of water on fabric and paper samples is illustrated, and precautions and sources of error are discussed.

26. VOLUMETRIC DETERMINATION OF MOISTURE IN COTTON TEXTILES

Keating, J. F.; and Scott, W. M.

Am. Dyestuff Repr. 31: 308-10. 1942

A titration method to determine moisture regain of cotton textiles is described. It is said to take about 30 minutes, compared with 5 to 7 hours required for the oven-drying method. Samples were weighed, cold-extracted with methanol for 10 minutes, and titrated with standard Fischer reagent. The method is considered as accurate as oven-drying, and the necessity for repeated weighings is eliminated.

Miscellaneous

1721. EFFECTS OF ROLLER GINNING AND SAW GINNING ON PIMA S-1 COTTON

Brown, John J.; Howell, Nathaniel A.; and
Ruppenicker, George F., Jr.

Textile Research J. 29: 444-47. 1959

A pilot-plant evaluation was made to compare the effects of roller ginning and saw ginning on the fiber, yarn, and fabric properties and processing performance of Pima S-1 cotton. The fabrics were compared in the gray and after finishing. It was found that, within the limits of this study, the general processing efficiency of the roller-ginned cotton was better than that of the saw-ginned cotton. The method of ginning had no appreciable effect on the strength, uniformity, or elongation at break of combed yarns, but carded yarns spun from roller-ginned cotton were significantly stronger than those spun from saw-ginned stock. Combed yarns spun from the roller-ginned cotton were better in appearance than those spun from the saw-ginned stock. There were no significant differences in the physical properties of sewing thread produced from combed saw- or roller-ginned cotton. Fabrics produced from combed cotton ginned by both methods were approximately equal in tearing strength, but the saw-ginned cotton produced fabric that, in some cases, had a lower elongation and breaking strength. There were no significant differences in abrasion resistance between the fabrics before finishing, but the results for abrasion resistance of the finished fabrics were inconclusive. The fabric woven from the saw-ginned cotton contained considerably more neps than that woven from the roller-ginned cotton. Since this type of cotton is generally used for the production of fine-quality yarns and fabrics, it was concluded that saw-ginned extra long staple cottons would not be suitable for these uses. Also, due to the greater amount of waste during processing and poorer spinning performance of the saw-ginned cotton, processing costs would be higher and possibly offset any savings in ginning costs.

1348. EFFECT OF COLLOIDAL SILICA TREATMENTS ON SIZING AND FINISHING CHARACTERISTICS OF COTTON YARNS

Brown, H. M.; Langston, J. H.; and Murray, E. A.

Contractor: School of Textiles, Clemson Agricultural
College, Clemson, South Carolina

Textile Research J. 26: 40-43. 1956

Cotton in lap form was treated with a colloidal silica compound, and together with an untreated lap was processed into 15/1, 36/1, and 50/1 yarns. Samples of these yarns were used to control, for mercerizing, for bleaching, and for dyeing. Analyses of ash content were made on these four sets of samples. In addition, other samples of the yarns were used to assess the reaction of slashing, desizing, and abrasion. In general, the

presence of colloidal silica, on medium and fine carded yarns, did not affect the operations of mercerizing, bleaching, and dyeing. Yarn strength differences between treated and untreated samples were of the same order after as before each of these chemical processes. Quantitative tests (ash-content analyses) to determine the effect of these processes on the performance of the colloidal silica on the fiber were inconclusive.

1146. EFFECT OF COLLOIDAL SILICA TREATMENTS ON COTTON PROCESSING CHARACTERISTICS AND YARN QUALITY

Brown, H. M.; Langston, J. H.; and Rainey, W. T., Jr.
Contractor: School of Textiles, Clemson Agricultural College, Clemson, S. C.
Textile Research J. 25: 462-71. 1955

The study seems to show that with cotton having a considerable range in physical properties, the use of selected additives to increase the frictional characteristics of the fiber results in stronger, more uniform yarns, which can probably be processed with fewer ends down in spinning. Of the cottons evaluated, improvement is greatest for low maturity, short staple cotton. Machine settings to produce optimum evenness are not very different from those for untreated stock except that higher roll weighting seems to be required.

1067. MEASUREMENT OF TRIBOELECTRIC RESPONSE OF RAW COTTONS

Kirkwood, C. E., Jr.; Bellamy, O. H.; Kendrick, N. S.; and Brown, H. M. Contractor: Clemson School of Textiles, Clemson, S. C.
Textile Research J. 24: 853-60. 1954

By use of a novel commutator method, triboelectric potentials produced by rubbing cotton and various materials have been measured by comparison with known D. C. potentials. Results are given for fiberboard (phenolic resin laminate, fabric base), cork roller material, synthetic rubber roller material, Lucite, polystyrene, glass, and cellulose acetate sheet, used as rubbing materials on 3 varieties of cotton and on trash extracted from baled cotton. It does not seem that triboelectric methods can be used to distinguish between varieties of cotton, since generated voltages are so nearly the same. But since there is a considerable difference between the voltage generated on cottons and on trash by some rubbing materials (fiberboard and cork roller material), it seems that practical use may be made of triboelectric methods to separate the trash from cottons.

994. DEVELOPMENTS IN EUROPEAN COTTON PROCESSING METHODS

Rusca, R. A.

Textile Research J. 24: 589-91. 1954Republished: Textile J. of Australia 29: 1066-68

European processing methods and machines are basically the same as ours. The labor situation is different. Research in textile machinery seems concerned largely with developing new equipment, or modifying cotton machinery, specifically to process synthetic fibers. Opening rooms are more complicated than average American opening rooms. One development on drawing frames is a new type of fluted roll which, combined with a slight tension draft in the middle drafting zone, reportedly produces a more uniform drawing sliver. Uniformity is improved also by using a 3-over-4 arrangement on drawing frames and combers. Some mills are changing to sliver lappers and 16-ends up bicoil drawing frames to eliminate one process of drawing or roving. Use of pneumatic and hydraulic systems in top-roll weighting is increasing.

1066. MEASUREMENT OF DIELECTRIC CONSTANT AND DISSIPATION FACTOR OF RAW COTTONS

Kirkwood, C. E., Jr.; Kendrick, N. S.; and Brown, H. M.

Contractor: Clemson School of Textiles, Clemson, S. C.Textile Research J. 24: 841-47. 1954

This research was a part of a project on the cleaning and opening of cotton by the use of static electricity. Its objective was to determine whether there are differences between the dielectric constant and the dissipation factor for cottons and for those of trash. By use of a suitable capacitance bridge and special condenser, the dielectric constant and dissipation factor at a frequency of 200 kc./sec. were measured for several varieties of cotton and for several types of trash removed during processing. Measurements were made at 70°F. and at relative humidities of 45%, 55%, and 65%. Results are in fair agreement with those obtained by other workers. Information on this type is not only useful in determining the electrical characteristics of cotton and trash, but may be of value also in the determination of the trash content of cotton, possibly leading to some method of separating the trash from the cotton.

863. (1) RESEARCH TO INCREASE PROCESSING EFFICIENCY AND QUALITY OF COTTON PRODUCTS. (2) NEW DEVELOPMENTS IN THE INITIAL PROCESSING OF COTTON.

Rusca, R. A.

(Two articles processed by National Cotton Council for inclusion in a pamphlet distributed at European Conferences.) June 1953. Also published in: Textile J. of Australia 28: 1322-24. 1954. Federation of Master Cotton Spinners' Assoc. February 1954. Syndicat general de l'industrie cotonnier.

(1) Increasing quantities of mechanically harvested and other cottons of high trash content have led to improvement of textile cleaning equipment. Conventional opening-picking organizations are compared with modern opening-picking organizations that provide more effective cleaning with less fiber damage. Several new machines for blending, opening, and cleaning are described, and results of mill applications of this new equipment to processing American upland cottons are presented.

(2) Recent research studies in the field of cotton textile processing include the development of new guides for the proportionment of draft for long-draft roving systems; the determination of the relation between single and ply yarn twists and ply yarn properties; effect of fiber strength on ply yarn properties; and effect of fiber fineness on single yarn strength. Examples are given of how yarn manufacturers can make practical use of this information.

849. WARP KNITTING RESEARCH INDICATES HIGHER EFFICIENCY IN COTTON TRICOT KNITTING

Shinn, W. E. Contractor: North Carolina State College, Raleigh, N. C.

The Knitter 16 (7): 1-5. 1952

One of the principal causes of breakage of cotton yarns in tricot knitting was found to be imperfections in structure, such as slubs and soft spots. More careful selection and preparation of the yarn is recommended, and winders should be fitted with slub catchers adjusted to prevent passage of the slubs and soft spots. Speed of the machines had little effect on the number of end breaks, but the yarn twist did, and a twist multiplier of 3.5 gave the best results. Sley points result in better knitting, and light applications of adhesive type warp sizes were found to greatly improve the knitting quality of cotton yarns. Results with different kinds of sizing adhesives are given. It is recommended that the fine-yarn spinning mills which supply the warp knitting mills with cotton yarns consider the installation of warpers and slashers so that sized warps can be made available to the knitting mills.

848. THE EVALUATION OF TEXTILE SIZES

King, David E.; Weil, Henry A.; Condo, Fred E.; and Rutherford, Henry A.

Textile Research J. 22: 567-73. 1952

The effect of sizing mixtures on the slabby portions of a staple yarn was determined indirectly by the application of the size to a cotton roving and subsequent testing of the roving for strength, ultimate elongations, and stiffness. In contrast to the methods which employ yarn as the base

material for the application of the size, large differences between sizing mixtures were found by this procedure. The evaluation method which was investigated proved useful for the screening of sizes for knitting yarns in which the failure to give good knitting quality was caused by the presence of the slubs.

690. COTTON YARN SIZING MATERIALS, PREPARATION AND PRACTICES--A REVIEW OF THE LITERATURE.

Shinn, W. E.; Sink, C. Boyce; and Parker, Mary E.

Contractor: North Carolina School of Textiles, Raleigh, N. C.

Textile Bull. 77 (1): 81, 82, 84; Part I, Sizing Materials. 77 (2): 57, 58, 60, Part II, Size Preparation. 77 (4): 85, 86, 90-91, Part III, Sizing Practices. 1951

Part I lists various materials used for sizing cotton yarns, with a brief description of their properties. A list of 27 literature references is included. Part II describes methods of preparing sizes on a plant scale, mentions a number of additives used to impart desired properties, and describes advantages and disadvantages of various methods. Part III discusses sizing practices, and variables which influence sizing results. Size concentration, the effect of stretch, drying temperatures, penetration, moisture content, and weight and covering of squeeze rolls are considered important. A number of conclusions drawn from reports in the literature are stated, and a list of 27 literature references appended.

515. SURVEY OF TRICOT KNITTING LITERATURE (Parts I--IV)

Shinn, W. E.; Sink, C. B.; and Parker, M. E. Contractor:

North Carolina School of Textiles, Raleigh, N.C.

The Knitter 14 (5): 48, 50, 51. 14 (6): 26, 28, 14 (7): 36, 39, 40. 14 (8): 40, 42, 44, 47. 1950

Literature on tricot knitting is reviewed, and a list of references on the subject is given.

437. DETECTION OF "HONEYDEW" ON RAW COTTON

Stansbury, Mack F.; and Hoffpauir, Carroll L.

U. S. Dept. Agr. Bur. Agr. Ind. Chem. AIC-262. Processed 1950.

A reliable qualitative test for the presence of honeydew on cotton has been developed. Honeydew is the sticky carbohydrate-containing excreta of aphids resulting from the partial digestion of plant sap on which these insects feed. The test is based on the alpha-naphtol (Molish) reaction, as applied to an aqueous extract of honeydew-contaminated portions of the cotton. A control test is carried out on clean, uncontaminated portions

of the sample. Ultraviolet fluorescence is often helpful in distinguishing between clean and contaminated portions. In applications of the test to several honeydew-contaminated cotton samples, the samples which give the strongest tests contained the greatest amounts of reducing sugars, 0.48 and 0.40 percent. Samples which had been picked after exposure to rain had considerable mold on the honeydew areas and gave only slight tests for honeydew. They also contained much less reducing sugars, apparently because of both the leaching by rain and the mold growth.

295. BIBLIOGRAPHY ON HIGH-FREQUENCY DIELECTRIC HEATING

Rusca, Ralph A.

American Institute of Engineers, August 1947

This bibliography, although admittedly not complete, is one of the most comprehensive published on the subject thus far. Literature citations and patents have been classified as "Domestic" and "Foreign," and are arranged alphabetically by title in these two categories. An author index is included.

188. DIELECTRIC HEATING ANALYZED FOR TEXTILE APPLICATIONS

Rusca, Ralph A.

Textile World 96 (5): 118-21, 212, 217, 220, 230.
1946

Fundamental theory, applicable formulas, and limiting conditions in the application of dielectric heating are discussed. A comparison is made of the electronic methods of generating high-frequency power; and the results of some preliminary research on dielectric heating of cotton textiles are reported. It is pointed out that while at present the economics of the process compares unfavorably with other methods of drying textiles, continued research and development may well overcome this limitation.

PATENTS

2056. CENTRIFUGAL FANS

U. S. Pat. No. 2,956,736, October 18, 1960
Mayer, Mayer, Jr.; and Kotter, James I.

An airfoil cutoff applicable to centrifugal fans and blowers which cutoff greatly decreases noise and improves fan efficiency.

2053. FIBER CLEANER

U. S. Pat. No. 2,951,265, September 6, 1960
Kotter, James I.; and Mayer, Mayer, Jr.

This invention relates to a fiber cleaner especially adapted for removal of trash, such as sticks, etc., from ginned cotton fibers, and has among its objects the provision in such a cleaner of a simple and efficient combing cylinder which operates to open with little fiber damage bunches of fibers to permit more readily ejection of the trash.

1894. SELF-FEEDING AND SELF-DOFFING OPENER-CLEANER FOR TEXTILE FIBERS

U. S. Pat. No. 2,893,064, July 7, 1959
Rusca, Ralph A.; and Young, Ray C.

An opener-cleaner for textile fibers characterized by a hollow fiber working beater cylinder which picks up partially opened fibers without benefit of auxiliary feeding elements and releases the cleaned fibers without benefit of a doffing element.

1795. CARDING APPARATUS

U. S. Pat. No. 2,879, 549, March 31, 1959
Miller, August L.; Brown, Roger S.; and Rusca, Ralph A.

A novel carding apparatus wherein the conventional revolving flats are replaced with a plurality of stationary adjacent bars or plates in the form of a cover spaced from the working cylinder. These stationary plates are secured to the flexible bend of the card and present a continuous granular or abrasive surface to the carding cylinder. This invention completely eliminates waste due to flat strips.

1790. FIBER CLEANER

U. S. Pat. No. 2,867,850, January 13, 1959
Mayer, Mayer, Jr.; and Kotter, James I.

An apparatus intended for use in the separation of trash from cotton fibers. This apparatus is a variant of the device described in U. S. Patent No. 2,848,754.

1703. FIBER CLEANER

U. S. Pat. No. 2,848,754, August 26, 1958
Mayer, Mayer, Jr.; and Kotter, James I.

A fiber cleaning device particularly effective for removing trash that is heavier than the fibers, such as sticks, pepper trash, etc. The fiber cleaner is applicable to ginned cotton fibers.

1635. FIBER CLEANER

U. S. Pat. No. 2,825,097, March 4, 1958
Kyame, George J.

A fiber cleaning device having a rotatable beater cylinder which carries trash-contaminated fibers against spaced grid bars adjacent to the beater cylinder. A doffer provides for the removal of the cleaned fibers from the beater cylinder.

1554. TEXTILE FIBER CLEANING MACHINE

U. S. Pat. No. 2,810,163, October 22, 1957
Kyame, George J.; and Latour, William A.

A textile fiber cleaning machine having a fiber recovery system for recovering portions of the fibrous material hitherto discarded. The yield of clean fiber thereby obtained is markedly increased.

1551. THICKNESS VARIATION MEASURING DEVICE

U. S. Pat. No. 2,805,449, September 10, 1957
Martin, Albert E., Jr.

A device, combining electrical and mechanical elements, which measures and records the root mean square of the deviation in thickness of continuous lengths of material. The device may be used for various textile materials, strips or batts such as picker laps and the like, strands such as slivers, rovings and the like.

1549. FABRIC ABRADER

U. S. Pat. No. 2,797,574, July 2, 1957
Rusca, Ralph A.; and Brown, John J.

An apparatus for determining the abrasion resistance of textile fabrics by abrading them in a manner that resembles the in-service wear of the fabrics.

1482. COTTON OPENER

U. S. Pat. No. 2,780,839, February 12, 1957
Young, Ray C.; and Rusca, Ralph A.

A machine for processing staple textile fibers. The device disclosed in this invention untangles or opens tangled masses of fibers and at the same time removes a large portion of any non-fibrous particles that are mixed with the fibers.

1335. FIBER DEFLECTOR

U. S. Pat. No. 2,745,144, May 15, 1956
Young, R. C.; and Rusca, R. A.

An invention that provides junctions between the revolving shafts, cylinders, etc., of processing units and the walls of suction flues enclosing portions of such shafts. The junctions prevent the rotating shafts from acting upon fibers to cause rolling, twisting, and/or nepping of the fibers, or choking due to entrainment of fibers around the shafts.

1330. CARD CLOTHING STRIPPER

U. S. Pat. No. 2,742,673, April 24, 1956
Pettit, G. A.; and Rusca, R. A.

A device for the removal of undesired impactions of fibers from the needles of card clothing. The device continuously strips the card clothing of carding machines during the carding operations.

1325. METHOD FOR SPINNING YARN FROM STAPLE FIBER

U. S. Pat. No. 2,732,682, January 31, 1956
Kyame, G. J.

The invention relates to a method and apparatus for spinning yarn strands of unlimited length from staple fibers. The invention eliminates the need for rings, travelers, spinning pots, etc., and combines the spinning and winding operations into one. The invention also provides a novel means for converting continuous rotary motion into synchronized intermittent rotary motion.

1254. PROCESS FOR INCREASING THE BREAKING STRENGTH OF STAPLE FIBERS

U. S. Pat. No. 2,724,657, November 22, 1955
Skalkeas, Basil G. Contractor: Lowell Textile Institute
Research Foundation, Lowell, Mass.

The breaking strength of yarns, such as cotton yarn, is increased by impregnating the yarns with a colloidal aqueous dispersion of silica, subjecting the wet yarns to a tension intermediate between the tension normally used in conventional procedures, such as slashing, and the breaking tension of the yarn, and drying the so-treated yarns with or without tension.

1250. FIBER CONVEYOR AND CLEANER

U. S. Pat. No. 2,712,162, July 5, 1955

Young, Ray C.; and Rusca, Ralph A.

A conveyor for transporting staple textile fibers comprising an endless flexible strip with a series of upward extending projections which project about $\frac{3}{8}$ inch above the strip at an angle of about 80° at a slant opposite the direction in which the strip moves. The projections are constructed to carry the fibers along, and to allow nonfibrous material to fall between them.

1191. FIBER TESTER

U. S. Pat. No. 2,706,403, April 19, 1955

Hertel, K. L. Contractor: University of Tennessee,
Knoxville, Tenn.

The "Stelometer"; a device for testing the strength and elongation at break of flat bundles of fibers. In the test the fibers are held between flat bundle clamps mounted on a frame that is arranged to fall smoothly against an air-damper. The fall of the frame causes a pendulum to swing in a direction tending to pull the fiber clamps apart. The swing of the pendulum pushes indicators that record the load applied and the elongation exhibited.

1190. NEP POTENTIAL METER

U. S. Pat. No. 2,698, 538, January 4, 1955

Bogdan, John F.; and Asbill, Clarence M., Jr.

An apparatus, comprising a series of contiguous cylinders covered with card clothing and rotated so that they nep staple fibers, for rapidly determining, from a relatively small sample, how much nepping can be anticipated during the processing of the fibers into card sliver.

1068. APRON SPLICING DEVICE

U. S. Pat. No. 2,694,436, November 16, 1954

Pettit, G. A.

A device for splicing aprons on spinning frames, etc., which is arranged so that both ends of the apron can be held in visual alignment before the clamping pressure is applied. The device consists of a frame arranged to extend above the roll of a spinning frame, clamps arranged to hold the ends of an apron which has been threaded around the roll, and a removable pressing device and backing plate, arranged to press the apron ends together until they are bonded by an adhesive.

927. ATTACHMENT FOR WEAVING HIGH DENSITY FABRICS

U. S. Pat. No. 2,649,864, August 25, 1953

Mayer, M., Jr.; and Kyame, G. J.

The attachment is a device which can be mounted on conventional looms to provide a means of weaving either an unusually dense cloth or an unusually uniform cloth of the usual density. The device consists basically of two horizontal stationary bars arranged across the front of the loom so that the warp strands, as they advance between the whip roll and the drop wires, pass between the bars; and one movable bar mounted in front of the other bars. Part of the strands are passed above and part are passed below the movable bar, and as the bar moves up and down in conjunction with the action of the lay sword, additional tension is applied to alternate groups of the warp strands at the moment of the beatup.

793. FIBER DOFFING DEVICE

U. S. Pat. No. 2,607,958, August 26, 1952

Rusca, R. A.; and Young, R. C.

The invention is a device for doffing (removing) fibrous materials (cotton) from rotating processing cylinders, such as toothed, spiked, fluted or smooth rolls. It is especially applicable to doffing cotton from a cotton-working machine patented by this Laboratory (U. S. Patent No. 2,365,793; 1944). A toothed cylinder is so designed that it will positively engage and doff fibers from other cylinders and at the same time doff the fibers from itself solely by the action of centrifugal forces. The invention eliminates the difficulties of adjustment, maintenance, and initial expense experienced by prior art which used air suction or air pressure or brushes for doffing fibrous materials.

683. METHODS AND APPARATUS FOR DRYING SIZED OR OTHERWISE IMPREGNATED TEXTILE MATERIAL

U. S. Pat. No. 2,578,744, December 18, 1951

Rusca, Ralph A., and Kyame, George J.

The process of drying comprises passing spaced impregnated textile strands through a radiant heating zone where they are exposed to rays from a gas-fired, infrared generator; controlling the ratio of combustible gas to oxidizing gas supplied to the generator and to the radiant heating zone to obtain a neutral, oxidizing, or reducing atmosphere; sucking the products of combustion into a lower temperature heating zone of reduced cross section, in which the strands move in the direction of, and in contact with, the combustion products, the strands being farther apart in the lower temperature zone.

682. APPARATUS FOR APPLYING SIZING AND OTHER COATINGS

U. S. Pat. No. 2,564,725, August 21, 1951

Rusca, Ralph A.

An apparatus featuring a simple means of regulating the amount of solution applied and a means for driving the rolls which eliminates stuffing boxes.

510. METHOD OF APPARATUS FOR PREPARATION AND DISTRIBUTION OF SIZING MATERIALS

U. S. Pat. No. 2,516,884, August 1, 1950

Kyame, G. J.

An improved method for the preparation and distribution of sizing materials. The unit comprises a storage tank, pump, heat exchanger, and size box so connected that the pump draws fluid simultaneously from both storage tank and size box, and pumps it through the heat exchanger. The heat exchanger discharge is divided into two streams, one going back to the storage tank and the other to the size box. Both streams are made to agitate the contents of the respective tanks, no other means of agitation being needed. To make this method more easily applicable, a novel float-type valve which controls the rate of fluid withdrawal is used to maintain a constant fluid level in the size box.

429. METHOD AND APPARATUS FOR ELECTRICAL HEATING

U. S. Pat. No. 2,492,187, December 27, 1949

Rusca, Ralph A.

An apparatus for heating textile materials by electrostatic fields created by high frequency electric currents. The apparatus provides a uniform heating and is particularly suitable for drying cotton cord used in the construction of pneumatic tires. The apparatus comprises a row of thin flat electrodes aligned to provide openings through which the material can pass and spaced apart further than the width of the electrodes. The electrodes are hinged to open to facilitate the threading of the material through them.

430. CORD STRETCHING APPARATUS

U. S. Pat. No. 2,474,927, July 5, 1949

Young, Ray C.; and Brown, John J.

An apparatus for stretching filaments, such as cotton cords for use in pneumatic tires, belts, and mechanical sewing threads. The apparatus comprises: forward and rearward rolls of about which the strand is wrapped; means for causing the peripheral speed of the rearward roll to lag behind those of the forward one; means for applying tension to the portion of the strand between the rolls; and means for causing the lag between the rolls to vary as the stretch of the strand varies.

636. PHOTOELECTRIC APPARATUS FOR MEASURING LAP UNIFORMITY HAVING
MEANS TO MINIMIZE TENSION ON THE LAP

U. S. Pat. No. 2,466,615, April 5, 1949

Rusca, Ralph A.; and Sens, Charles L.

A photoelectric apparatus for measuring the uniformity of textile mill laps in a continuous process without detrimentally affecting the layers of cotton or other fibers composing the lap. The apparatus consists of a plate provided with an opening through which beams of light are projected through the lap onto light sensitive photoelectric cells which actuate an automatic graphic recorder. Means are provided for unrolling and rerolling the lap after it is measured.

170. *CUTTING MACHINES

U. S. Pat. No. 2,370,129, February 27, 1945

Asbill, Clarence, M., Jr.; and Hill, Grover B.

A machine for cutting fibrous materials, such as lint cotton, into short fibers. The materials are fed into the bite of coacting series of intermeshing cutting discs turning towards each other at relatively high speeds. Each disc is a right cylinder, wide in diameter, but short in height, and having sharp corners, which do the cutting. The machine, although small in size, has a large capacity and a continuous action.

110. *COTTON-WORKING MACHINE

U. S. Pat. No. 2,365,793, December 26, 1944

Asbill, Clarence M., Jr.; and Young, Ray C.

A cotton working machine which: breaks up large lumps of cotton into finely divided lint; feeds the lint at a relatively uniform rate into a lint flue conveyor; and facilitates the removal of trash and other foreign matter from the lumps of cotton. An endless conveyor moves the cotton towards a series of saw-toothed rolls which turn in the same direction and are arranged so that the mass of cotton is caused to revolve by the action of their inner edges combined with the action of the conveyor.

107. *MATERIAL-CONVEYING FLUE

U. S. Pat. No. 2,344,528, March 21, 1944
Asbill, Clarence M., Jr.

An improved air-blast conveyor-flue for conveying fibers. The flue has a longitudinal fin attached to its inside wall which inhibits the spiralling air motion which in ordinary flues cause objectionable roping and tangling of some materials such as long-staple cotton fibers. The fibers pass freely through the improved flue and are not injured by the fin.

* Cotton Ginning Laboratory, Department of Agriculture, Stoneville, Mississippi.

Patent Applications Pending

PC 3375: "Lickerin and Feed Roll Cover," Rober S. Brown and August L. Miller

An improved type of lickerin cover which also covers the feed roll of a conventional carding apparatus and improves the cleaning action of the lickerin and reduces the loss of spinnable fiber.

PC 3403: "Carding Apparatus," A. L. Miller, R. S. Brown, and R. A. Rusca

A preopener roll installation for location at the back knife plate of a carding apparatus. This device is particularly valuable used in conjunction with a card modified according to U. S. No. 2,879,549 (the Granular Card).

PC 3593: "Method and Apparatus for Measuring Absolute Softness of Yarns," Evald L. Skau

A method and apparatus for measuring the absolute softness of yarns in terms of the percent increase in yarn width when the yarn is subjected to lateral pressure between two parallel plane surfaces.

PC 3651: "Air-Blast Doffer and Condenser," George J. Kyame and William A. Latour

A condenser for forming fibers conveyed by air into a batting. The uniform distribution of fibers is accomplished by an improved conduit design which decreases turbulence and allows a uniform flow of air onto the condenser cage.

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